# RailwayAge

WITH WHICH IS INCORPORATED THE RAILWAY REVIEW

FIRST HALF OF 1927-No. 17

NEW YORK-MARCH 26, 1927-CHICAGO

SEVENTY-SECOND YEAR

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# AMERICAN LOCOMOTIVE GENERAL ELECTRIC







Northern Pacific Yards, St. Paul-Photo by Ewing Galloway

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Some of the Railroads Using Truscon Products

# RailwayAge

Vol. 82, No. 17

March 26, 1927

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# The Key to Teamwork

MANY railway supply representatives travel continuously, calling upon railroad officers and cultivating or being of service to railway men. In many instances they received their early training in railway service and are keenly interested in railway improvements and progress. It means something, therefore, when a number of these representatives independently express the idea that there is a noticeable difference in atmosphere at places where supervisors' clubs or organizations are functioning, or where special means are taken to provide friendly contacts and understanding between the supervisors. Such organizations or arrangements, they claim, provide the key for solving the problem of securing teamwork and co-operation. Have you noticed this? Is it true? The claim is also made that if a spirit of understanding exists among the supervisors and foremen, it is bound to extend down and through the entire or-

# The Public Be Pleased

THE railroads are looking constantly to the comforts and needs of their patrons. Nothing is being overlooked if it is in any way reasonable or if it appears that it will create in the public that glow of satisfaction which pays so well in good will. In short, the Golden Rule has been found again to be an excellent and commercially sound business policy. It is reported that one railroad intends to inaugurate the custom of serving tea to passengers on some of its limited trains. Another railroad is reported to have ordered the arms removed from the benches in its waiting rooms so that those who, tired with waiting through long hours, care to relax and stretch out on the benches, may do so with a greater degree of comfort than heretofore. These may seem like extreme examples of offering the public a bit of extra attention. They are evidence, however, that the railroads are studying carefully the desires and needs of their patrons.

# Suggestion for Passenger Coach Arrangement

A SUGGESTION was made recently by a mechanical department officer for a possible improvement in passenger car design to which thought has evidently not been generally given. In a large proportion of all day coaches the toilets are located at the ends of the car. This has been customary in passenger car construction for many years. Two objections have been raised to this standard location of the toilet room; namely, the lack of sufficient privacy at the entrance and the nuisance of having the toilets located over the trucks. It has

been suggested that day coach passengers would be better pleased if the toilets were located at the center of the car instead of at the end. This location has possibilities for a change in the aisle arrangement that will provide increased privacy at the entrance of the toilet rooms such as is obtained in Pullman construction, and it also removes the toilets from immediately over the trucks.

# High Pressure Transportation

OIL fields have a way of developing at unexpected and unhandy places. Usually, too, the fields are brought in just at a time when the railroads in the vicinity are busy moving a traffic that is taxing the capacity of their lines. The Panhandle oil field in Texas was typical in all these respects. It developed 30 miles from the nearest railroad, which was the main line of the Panhandle & Santa Fe. Just at the time when that line was handling the heaviest traffic in its history thousands of cars of rush freight to and from the oil fields were dumped upon it, almost without warning. Fortunately for the railroad and even more fortunately for the oil people interested, the Santa Fe has had to deal with numerous other oil rushes, all the way from Kansas to California, and the experience gained by its officers stood them in good stead in this instance. They knew what to do and how to do it. More important, they knew "when to do it," which, in the oil fields, is synonymous with "right now." The details of this remarkable performance are given elsewhere in this issue. They form an interesting and unusual record of producing transportation at high pressure and under handicaps, that reflects credit upon the entire railway in-

# B. & O. to Paint Locomotives Green and Name Them

THE Baltimore & Ohio will receive next week from the Baldwin Locomotive Works twenty new passenger locomotives which will be painted olive green, striped with red and gold. This innovation is probably the most outstanding development in the general movement toward improved appearance of locomotives which has taken place since the Southern last year painted parts of some of its passenger locomotives in color. new Baltimore & Ohio locomotives, in addition to being adorned with colors, will be named after the first twenty presidents of the United States. Details of the program are given in a news item elsewhere in this issue. road announcs that the new color scheme was adopted to make the locomotives harmonize in color with the cars. The announcement says further that some of the pioneer locomotives of the road "were gaily bedecked

with the different hues of the rainbow," but that from 1878 the practice of making locomotives pleasing to the eye seems to have been abandoned. If this latter statement is true, and there will be few to gainsay it, then it would seem that history is tending to repeat itself. Not in many years have locomotives the country over presented such a pleasing appearance as they do at the present time and still further improvement may be noted almost daily.

# The Railroad as a Disciplinarian

NEWS that the Denver & Rio Grande Western has been able to persuade some of its more careless patrons to march to the ticket window and purchase the necessary pasteboard which was neglected when the patron boarded the train to ride "the blind," or, possibly, when he slipped across "the rods" with the thought that tickets for that space were not customary and so not needed, may be taken as being further evidence of the growing efficiency of railroad operation. "Cut down every possible loss of revenue" and "neglect no possible source of new revenue" might be said to be highly favored mottoes today. The road that is able to make the hoboes, who try to abuse it, buy tickets, is proving not only a wise business organization, but a good disciplinarian. When the "'Bo" finds that he is made to pay for his uncomfortable form of transportation, he will be likely to pass up that particular road as one of his favorites or, in time, may learn to avoid the railroads altogether.

# Strikes in Public Utilities Called Poor Labor Strategy

PROFESSOR HAROLD J. LASKI of the University of London, who is well known as a student of the labor movement and sympathizer with the socialistic aims of British organized labor, in a recent summary of the general strike fiasco in England (New Republic, March 2) has reached some rather far-reaching conclusions, The most important of them, it seems to us, is the following:

It is, at that, dubious whether the unions concerned in public utilities, e. g., railroads, mines, electricity, are the front line trenches. Their stoppage is spectacular. But the services they perform are so necessary that modern government either knows how to run them directly, or can, by foreign purchases, replace the goods they supply.

Professor Laski is not a disinterested academist. Rather his career has been one of frank championship of the radical aims of British labor. When, therefore, he in the fullness of his study and experience admits that strikes which threaten the continuous operation of public utilities—railways, mines, electric power—are fore-doomed in the long run to failure, his opinion is worthy of attention; and if his conclusions hold true in a country like Britain where labor is strongly entrenched, how much more applicable are they under conditions which obtain on this continent!

# Eight Lessons in Courtesy

EVERY wise superintendent would be glad if he could commend employees at least as often as he censures them. To carry out such an idea as regards individual employees is practically impossible; for in the nature of the case exceptional things (misconduct) call for com-

ment, and normal things (good conduct) do not. Getting away from the individual and considering thousands of men as a whole, we go to the other extremeby a New Year's circular we commend with all sincerity the good conduct of everybody, while overlooking everything that has been done amiss, as well as all laziness, lack of loyalty and other deficiencies. In the admittedly difficult task of maintaining a proper balance in this element of discipline there is and will continue to be ample room for the exercise of ingenuity. This is true notwithstanding the noticeable improvement that American passenger trainmen have made in their behavior in recent years. As an interesting experiment tending to make employees intelligently interested in being commended, we print in another column a circular on good manners recently issued by Harry W. Forman of the It speaks for itself and needs no in-Western Pacific. troduction. Not the least of the virtues of such action by the Western Pacific is the promulgation of this bit of good advice through an officer who comes into frequent and intimate contact with the trainmen and to whom they can talk with freedom.

# Indifference Toward Bus and Truck Legislation Is Dangerous

 $m{B}^Y$  aiding in the passage of regulatory measures, or in the prevention of the enactment of unfairly favorable legislation, the railways can protect themselves in a measure against competition of the "cut-throat" variety from buses and trucks. It is surprising that some railways are apparently indifferent toward the legislative measures affecting the highway carriers that come up for consideration and possible enactment in the states where they do business. As a case in point, the situation in Ohio may be referred to. Two bills are pending in the Ohio legislature which, if passed, will encourage cut rates among bus and truck operators. These laws are sponsored by a combination of bus lines of state-wide proportions, the aim of which seems to be the securing of a monopoly of the business of transportation for hire over the highways of the state. Most of the railways in Ohio are strongly opposing the passage of the measure, and there seems to be little prospect of its enactment into law at the present time. railways, however, have seemed to be indifferent toward the matter. Such an attitude may well be dangerous. Through consolidations and other forms of pooling of interests, the independent bus and truck operators are becoming stronger and stronger, as is the influence that they wield. Only through unanimous, united effort can the railways hope to continue to protect themselves and their business from inimical legislation of the sort now pending in Ohio.

# The Way Freight

THE movement of traffic to and from local stations has shown an increase at least commensurate with that of traffic in general. As a result, way freight trains have become an increasingly important factor in division operations. Proper supervision of way freights is not an easy task. Once they have left the terminal their operations are largely controlled by the conductors. The practice followed on most roads of superintendents, trainmasters and other officers riding the local freights is a good one, and serves a double purpose. In addition to enabling the officers to supervise conditions at

local stations, it also enables them to observe the operation of these trains. This is important, since there are many patrons of the railroad whose only intimate contact with a railway is with the agent and the way freight conductor. These patrons are in the smaller towns, where, in many cases, the changing sentiment towards railroads has not yet penetrated, and the opinion in which the railroad is held rests to no small degree with the way freight crew. Then, too, the way freight train, if improperly handled, is a fertile source of overtime, of fuel waste, and of equipment waste, all of which have an adverse effect on the transportation costs of the division. By co-operation between the despatcher and the way freight conductor, many minutes may usually be saved on each run and, with the increased unit costs of transportation, every minute counts.

# Net Railway Operating Income

A CCOUNTANTS are frequently criticized on the ground that when they set up the figures for a business they are unable to express the results of the activity of a departmenet or a company so that others can obtain an entirely adequate picture of exactly what Thanks to the Interstate Commerce the figures mean. Commission and its requirements of accounting standardization, this criticism is probably less applicable in the railroad industry than in any other. Nevertheless, we have by no means reached perfection. Incontrovertible proof of this is found in the fact that there are still a surprisingly large number of railroads that do not show in their annual reports the all-important item of net railway operating income or net after equipment and joint facility rents. Some years ago-first when the Interstate Commerce Commission required this item to be shown in the monthly earnings reports and then more particularly after the passage of the Transportation Act -more and more carriers decided to indicate this item in their annual reports to stockholders. Then, for some reason, retrogression succeeded progress and in recent years the number showing the figure of net railway operating income has become less rather than greater.

Net railway operating income as a unit is so important that it is defined in the Transportation Act. It represents the amount that is used in figuring the return on railway property and which, for the carriers as a whole or by groups, is supposed to equal 534 per cent of the property investment and, for the individual carrier, is supposed to be recapturable to the extent of onehalf of any excess over 6 per cent. To the stockholder or the analyst it has its greatest value because this is the item that is reported monthly to the Interstate Commerce Commission and given wide publicity in the financial columns. It would seem desirable also that it should be reported at the end of the year in the annual report to the stockholders.

# Acts of Heroism Rewarded

HEROES may be born or made. Heroism may be an act performed voluntarily as a result of training or environment, or it may be an involuntary and spontaneous reaction to an impulse. In the former case, the individual acts with the impending danger to himself in mind, while in the latter he acts without consideration of the consequences. In either instance, acts of heroism among employees should be rewarded by the management, for such action promotes closer relation-

ships between employees and management, since most people are hero worshippers and approval of a heroic act by the management is in keeping with their own reactions. In addition, the saving of human life or the prevention of accidents benefits both employees and man-

agement.

Few medals have been awarded to railway employees for acts of heroism. Among these the Pennsylvania established the practice of recognizing acts of unusual bravery through the awarding of medals in 1922 and two men received medals in 1923, 27 men in 1924, and 24 men in 1925. The Medal of Honor Act passed by Congress in 1905 provides for the awarding of medals for acts of valor among railway employees by the President of the United States upon the recommendation of the Interstate Commerce Commission. To date 25 such medals have been awarded, the latest being to C. M. Giblin, a brakeman on the Illinois Central, for saving the life of a woman on September 29, 1925, at New Orleans,

More recently a total of four medals were awarded. to employees of the Chicago, North Shore & Milwaukee, the Chicago Rapid Transit Company and the Public Service Company of Northern Illino.s, for the saving of human life during 1926, the award being instituted by Britton I. Budd a year ago among employees of the companies of which he is president. Three of the incidents recognized by these medals occurred out of the line of duty, while none of those whose lives were saved was in any way connected with the organizations con-

# Commissioner Eastman Dissents

HE St. Louis-San Francisco is about to sell some common stock. It proposed first to sell preferred stock, but apparently came to the opinion that its credit was so excellent that it could just as well sell common. The amount is to be \$15,096,240 and is to be offered to present holders of common stock for subscription in the ratio of three shares of new stock for ten shares of old. The whole railroad world will join in congratulating the Frisco upon its remarkable prosperity. The road came out of receivership on November 1, 1916. For some time thereafter there was considerable concern as to whether the company could meet the interest on its income bonds. It did not begin to pay dividends on its non-cumulative preferred stock until November, 1924. The initial dividend on the common stock was paid only as recently as January, 1925, and then only at an annual rate of 5 per cent.
The rate was raised to 7 per cent with the October,

1925, payment and the present 8 per cent rate was established so recently that the first payment at the new rate will be on April 1, 1927. In 1926, furthermore, according to the preliminary earning statement, the road earned after interest charges and the dividends on the preferred no less than \$14.17 a share on the common stock. The new stock will be offered at par. Frisco common is now

selling at about 110.

There is one discordant note. The Interstate Commerce Commission has approved the issue but Commissioner Eastman has dissented. It is quite likely that progress in public utility regulation is the greater for the progressive attitude and ability to think clearly and independently that Commissioner Eastman brings to his tasks, but might he not accomplish more if he did not say "no" quite so frequently? Everything the railroads propose to Division 4 surely cannot be so decidedly

wrong as would seem to be indicated by the large percentage of the decisions from which the commissioner finds it necessary to dissent.

# Individuality in the Design of Passenger Stations

A STUDY of railway architecture in America throughout the century of steam transportation history goes to show that railroad buildings have been no better or no worse than contemporaneous structures built by others. The scroll saw and turning lathe period left its stamp on frame passenger stations in the form of meaningless embellishment to about the same extent that it disfigured residences built at the same time. Similarly, advance in the architectural design of public buildings in large cities has been reflected in the improved design of passenger terminals. In general, therefore, it may be said that the railroads have done their share to improve the appearance of American cities. That they have not done more is the fault of the American people rather than of the railroads.

Architectural styles created in one part of the continent are so quickly copied or adopted elsewhere that a business block or a public building in Toronto, for example, is constructed along the same lines as one in Dallas, Texas. This tendency has largely bereit American cities of any individuality which may be expressed in passenger station design. There are, of course, exceptions to this rule, for example in certain sections of the East, where colonial models are frequently applied, and in the southwest where there is now an awakened interest in the old Spanish architecture which had all but succumbed to this standardizing process.

Railways have long recognized the advertising value of handsome passenger stations, particularly if they possess individuality. They have also learned to their sorrow the fallacy of endeavors to this end through the creation of freak designs. It is rather in the background of local tradition that the opportunity is offered for architectural expression in a way that will be most distinctive and at the same time entirely legitimate. Furthermore, such developments not only possess advertising value but also an appeal to local pride that is sure to react to the advantage of the railway.

# Operating Cut-Out Engines in Train Control Territory

I T IS particularly noticeable that in its last four or five final train control inspection reports the Interstate Commerce Commission has inserted requirements to the effect that non-equipped locomotives, or locomotives with the train control cut out, must not be run in road service in train control territory, unless double-headed behind a locomotive on which the train control apparatus is in service. These requirements indicate that the commission intends to follow up the maintenance and operation of train control equipment.

In one month recently, eight roads, with a total of 1,072 engines equipped with train control apparatus in service, cut out the device in 175 cases in a total of 24.755 trips, or, in other words an average of one cut-out in 142 trips. A report issued recently stated that one road with 32 locomotives equipped permitted 26 trips

to be made in 15 days with the equipment cut ont. These examples are, of course, extreme and do not represent the general standard of train control maintenance on the majority of the roads. They do, however, emphasize the importance of better maintenance of train control equipment on locomotives,

If the majority of the roads using a certain type of train control are securing satisfactory results, more attention must be given to the details of the tests on those roads where failures are more frequent. Information concerning tests to be made and the way to make them has been issued and is readily available. It remains for the railroads to make the tests. The best results are secured by making an inbound test to locate any trouble before the engine goes in the roundhouse so as to allow time for adjustment and repair, and then to make another test when the engine is ready to leave.

The situation may be summarized in the statement that "it can be done." As long as the roads have spent large sums of money for train control, the commission's requirement that this equipment be so maintained as to render the protection intended is reasonable.

# The Metric System

# On the Railroads

ONE of the most persistent campaigns of propaganda that has been promoted in recent years is that having for its objective the substitution of the metric system for our present system of measurements. Through its efforts a bill was introduced in the last Congress to establish this system by January 1, 1935. As a result of the opposition of the railways and others, however, no action was taken and the bill was never reported out of committee. Although it is therefore dead, its proponents are continuing their propaganda actively and as recently as the current month the statement appeared in the house organ of a large manufacturer that, "The United States during the present year will take final legislative action to place its merchandising on the decimal metric basis in weights and measures."

This campaign presents a conflict between theory and practice that should receive the serious consideration of executives of all industries. The metric system has much to commend it in theory. Its advocates ignore the fact, however, that another system of measurement is already established in this country and that industry has been developed in accordance with its units. It further ignores the fact that any change in our present standards of measurement will lead to chaos in industry. It was for this reason that the American Railway Engineering Association went on record in 1920 as opposing this change and it, together with the American Railway Association, presented testimony before the committee last year showing that the transition to the metric system would involve expenditures by the railways alone running into the hundreds of millions of dollars, while the confusion in records and the possibilities of error would continue for a long time.

Congress has adjourned and there is no further danger of legislation on this subject for several months. The railways in common with other industries cannot afford, however, to relax their vigilance as long as organizations promoting the metric system remain active, but must be prepared to meet any move that may be made by the advocates of this system until they are brought to the realization of the fact that their cause is hopeless.



The Baldwin High-Pressure, Three-Cylinder Compound Locomotive

# Locomotive 60,000 Test Results

Western Railway Club papers\* devoted to performance of Baldwin experimental high pressure compound 3-cylinder locomotive

By Lawford H. Fry

Metallurgical Engineer, Standard Steel Works Company, Philadelphia, Pa.

NE of the outstanding demands of present day railroading is for greater power per unit of locomotive weight. A study of the development of the steam locomotive will show that growth in size, which at first was rapid, is now slowing down; that the earlier demand for greater power has developed into a demand for greater concentration of power; and that considerable advances in power concentration have been made in recent years. In the twenty years from 1904 to 1924 the horsepower obtainable per 100 lb. of locomotive weight increased by approximately 65 per cent. Representative figures for freight locomotives show that in 1904 the locomotive weight required to develop one horsepower was 175 lb. By 1924, this was reduced to 110 lb., while in 1926, locomotive No. 60,000 with which we are now concerned developed over 4,500 hp. with a weight of 457,000 lb., or one horsepower per 100 lb. of locomotive weight.

The complete story of the advance made in power concentration in the last twenty years would include many devices and appliances. Super-heaters and feedwater heaters play their part, but one of the major factors is increase in boiler pressure. Twenty years ago a boiler pressure of 180 to 200 lb. per sq. in. was high. Then pressures of 200 to 210 lb. became standard. In the last five years a large number of locomotives have been built for pressures of 240 and 250 lb. per sq. in.

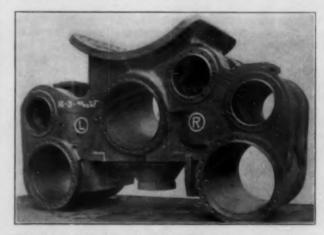
been built for pressures of 240 and 250 lb, per sq. in. This pressure of 250 lb, per sq. in, is probably about the maximum that can be used with the conventional type of boiler having flat firebox walls braced with stay-bolts. In the last few years, however, several experimental locomotives with special boilers have been built for pressures of 350 and 450 lb, per sq. in., and at least one European locomotive is working with a pressure of 880 lb, per sq. in. Locomotive No. 60,000 has a working boiler pressure of 350 lb, per sq. in,

In order to use steam at this pressure successfully two things are essential:

(1) an adequate boiler construction; (2) cylinders arranged to give a high ratio of expansion.

\* Presented at a regular meeting of the club held at the Hotel Sherman, Chicago, March 21, 1927.

The necessity for the first is self evident, while the second follows from the fact that with long cut-off and high boiler presure, the exhaust pressure will be high and the steam will carry away energy which should be used in the cylinders. It is for this reason that locomotive No. 60,000 has been designed with compound



The Three Cylinders and the Saddle of Locomotive 60,000 Are All in One Casting

cylinders. The point is discussed below at greater length in connection with the details of the tests. [Mr. Fry here described by the use of slides various features in the construction of locomotive No. 60,000,—Editor.]

#### Results of Tests

The maximum evaporation obtained during extensive tests on the Altoona locomotive test plant was 69,695 lb. of steam per hour. The maximum equivalent evaporation was 84,184 lb. per hour and at this rate of operation the steam pressure and temperature were well maintained. As the rate of firing was only 135 lb. per sq. ft. of grate per hour, a higher rate of evaporation could undoubtedly have been attained if the locomotive had not

already reached the capacity of the testing plant. At a higher rate of evaporation, however, the boiler would have been unduly forced and the figures given represent probably about the maximum evaporation likely to be reached in service.

The boiler efficiency varies from about 70 per cent when 30 lb. of coal is fired per hour to about 52 per cent at the maximum rate of about 135 lb. of dry coal per sq. ft. of grate per hour. This efficiency is about that of a well designed boiler of conventional design.

Study of the way in which heat is taken up by the boiler is permitted by measurements of the temperature at the center of the firebox, at the back flue sheet and in the smokebox. From these temperatures it is found that at a medium rate of evaporation the firebox takes up about 38 per cent of all the heat absorbed by the boiler, the evaporation flues about 52 per cent, and the superheater about 10 per cent. This distribution of heat absorption is only slightly affected by the rate of operation.

Before showing the results obtained with locomotive No. 60,000, the general question of the use of high pressure steam in locomotive cylinders should be examined. In the first place it must be recognized that with a reciprocating locomotive two limiting conditions will obtain, irrespective of the steam pressure used. The first is that the temperature of the steam coming from the superheater will be about 650 deg. F., and the second is that exhaust must take place to the atmosphere. To see how these conditions affect the results obtained with various boiler pressures, consider the figures given in Table I.

#### Table I

Test 7907	Pressure	Temp.	Heat per lb.
Branch pipe	322 lb. per sq. in.	652 deg. F.	1,338 B.t.u.
Exhaust pipe	11 lb. per sq. in.	248 deg. F.	1,164 B.t.u.

These are taken from test No. 7907 on the Altoona test plant. This table shows that a pound of steam at branch pipe pressure and temperature carried 1,338 B.t.u. and that the same pound of steam at exhaust pipe pressure and temperature carries only 1,164 B.t.u. The difference of 174 B.t.u. represents the energy taken from the steam and converted into work in the cylinders, together with the heat lost from the cylinders. This loss is small so that the difference between the total heat in the branch pipe and the total heat in the exhaust pipe represents closely the work done by the steam in passing through the cylinders.

I am indebted for this idea to C. D. Barrett, assistant engineer of tests of the Pennsylvania, who pointed out that if the amount of steam passing through the cylinders is known the indicated horsepower can be determined without using an indicator, but by measuring the pressures and temperatures in the branch pipe and in the exhaust. In the test represented in Table I., each pound of steam loses 174 B.t.u. in the production of work and 49,763 lb. of steam pass through per hour, making a total of 174 × 49,763 B.t.u. per hour converted to mechanical work. Now at the thermal equivalent of a horsepower is 2,547 B.t.u. per hour the above corre-

sponds to 
$$\frac{174 \times 49,763}{}$$
 = 3,400 cyl. hp. The horsepower

2,547

as determined by the indicator for the test in question was 3,411 which figure is in very close agreement with that calculated above from the heat at admission and exhaust.

With superheated steam an increase in boiler pressure, when the temperature of the steam remains the same reduces slightly the amount of heat per pound of steam entering the cylinders. That is, the heat available for conversion into work is less; therefore to obtain an increase in the amount of work done per pound of steam it is necessary to reduce the heat in the exhaust steam as the boiler pressure is raised.

In practice this result is secured if the release pressure or pressure at the end of expansion is maintained constant, while the admission pressure is raised. To do this the higher pressure steam must be given a higher ratio of expansion. If steam is to expand to a given release pressure, say 45 lb. per sq. in., from two different admission pressures, say 205 and 335 lb. per sq. in., more expansion is necessary from 335 than from 205 lb. to reach the same release pressure of 45 lb. This longer expansion converts more heat into work and thus the steam from the higher pressure has less heat at release although the release pressure is the same in both caes. This is illustrated in Table II.

## Table II-One Pound of Steam at 650 Deg. F.

Expansion from 205 lb. per sq. in.  Pressure At admission. 205 lb. per sq. in. At release 45 lb. per sq. in. After exhaust. 10 lb. per sq. in. Energy converted to work = 1,346 — 1,171 = 175 B.t.u.	. 1,346 B.t.u.
Number of expansions = $\frac{1}{2.92}$ = 2.7	

Expansion from 335 lb. per sq. in.  Pressure  Pressure  At admission, 335 lb. per sq. in. 218 deg. Su'heat  At release 45 lb. per sq. in. 0.99 per cent dry  After exhaust 10 lb. per sq. in. 0.96 per cent dry  Energy converted to werk = 1,338 — 1,122 = 2	7.10 cu. ft.	Heat 1,338 B.t.u. 1,168 B.t.u. 1,122 B.t.u.

Here steam at an initial temperature of 650 deg. F. is assumed to expand adiabatically, that is, without loss or gain of heat, from two different admission pressures to a release pressure of 45 lb. per sq. in., and then to be exhausted at 10 lb. per sq. in. The admission pressures are taken at 205 adn 335 lb. per sq. in. respectively. The table shows that the steam expands 2.7 times in dropping to 45 lb. per sq. in., from 205 lb. per sq. in., and 3.7 times from 335 lb. per sq. in. At release the steam has a pressure of 45 lb. per sq. in. in both cases, but has 66 deg. F. superheat from 205 lb. per sq. in. and one per cent wetness from 335 lb. per sq. in. It is found, as shown in Table II, that the maximum heat extractable from each pound of steam in the cycle assumed is 185 lb. t.u. from 205 lb. per sq. in. and 214 lb.t.u. from 335 lb. per sq. in. That is to say the increase from 205 to 335 lb. per sq. in. makes possible an increase in efficiency of 15.7 per cent, but to obtain this the number of expansions must be increased from 2.7 to 3.7.

To sum up in general terms the results shown for a particular case in Table II, we may say that when steam is expanded to a given release pressure an increase in admission pressure will reduce the total amount of heat in the steam at release, but will require an increase in the ratio of expansion.

It should be noted that even without an increase in boiler pressure an increase in cylinder efficiency can be obtained by increasing the expansion but this will reduce the exhaust pressure and a limit is thus set to the increase in expansion possible by the fact that exhaust has to be made to the atmosphere so that the release pressure cannot be lowered indefinitely. Therefore, increase in boiler pressure offers the greatest opportunity for increase in efficiency. At the same time the use of higher pressures has the mechanical advantage that the power obtainable from a given cylinder volume is increased. Coming back now to locomotive No. 60,000 we note that the necessity for a high ratio of expansion led to the use of compound cylinders. A higher expansion than is usual could have been obtained in two cylinders by using special valves and valve motion, but on the

whole it seems simpler to use three cylinders and to compound them. The three cylinders have also the advantage of reducing by one-third the power to be transmitted by any one piston. With three cylinders decided on, the compounding adds no further complication.

#### Water Rate Curve Is Unusually Low and Flat

A curve showing the water rate is plotted in Fig. 1 in relation to the indicated horsepower. This curve is flatter than any similar curve obtained for a single expansion locomotive. For all cut-offs from 50 per cent in the high and 20 per cent in the low pressure cylinders to 80 per cent high and 50 per cent low, and for all speeds from 80 to 160 r.p.m. (15 to 30 miles per hour) the water rate lies between 14.2 and 15.2 lb. per hp. hr., and even at a 90 high 70 low cut-off the water rate is only 16.3 lb. at 15 miles per hour and 16.6 lb. at 22.5 miles per hour. Examination of the information available from published records shows that the best water rate on record for an American freight locomotive ranges from 15.5 to 19 lb., these figures being obtained with 250 lb. per sq. in. boiler pressure. usual modern locomotive with a boiler pressure of 200 lb. per sq. in. and a possible full stroke cut-off will usually have a water rate ranging from 17 to 27 lb. per hp. hr. It is evident that in locomotive No. 60,000 the combination of high boiler pressure and compound cylinders gives a high degree of engine efficiency. maximum drawbar pull measured on the plant ranged from 70,000 lb. at 15 miles per hour to 35,000 lb. at 57.5 miles per hour. Tests made in road service with a dynamometer car have shown slightly higher figures at speeds above 15 miles per hour, and a maximum pull of \$7,000 lb. in a stalling test.

#### Coal Consumption per Mile

In conclusion the curves in Fig. 2 are presented to show the coal consumed per mile for various combinations of drawbar pull and speed. These curves were de-

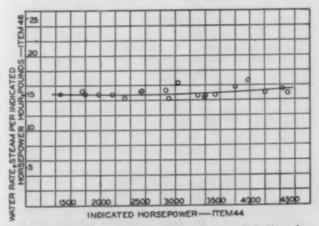


Fig. 1—Relation Between Water Rate and Indicated Horsepower

veloped by the Pennsylvania test department and are believed to summarize completely all the information which the operating department would wish to have regarding a locomotive. They show the price that must be paid in coal per mile for any desired combination of speed and drawbar pull.

Attention is called to the general flatness of the curves. For example, when 280 lb. of coal is burned per mile the speed can be increased from 15 to 25 miles per hour, that is, by 67 per cent, while the drawbar pull

is reduced only from 44,000 to 40,000 lb., that is, only by nine per cent.

#### Locomotive No. 60,000 Tested on Five Roads

Since leaving the locomotive test plant, locomotive No. 60,000 has been loaned for trial to five different railroads, has run between 15,000 and 20,000 miles in tests. The tests made confirm throughout the results obtained on the test plant. In fact, the dynamometer car records show slightly higher drawbar pulls than were obtained in the plant tests. Complete figures as to the results obtained on the road are not available as the tests were

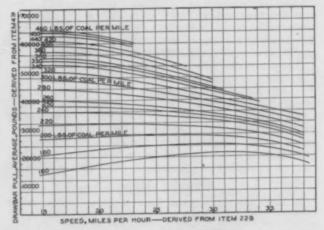


Fig. 2—Relation Between Drawbar Pull and Speed, for Various Rates of Coal Consumed per Mile

conducted by the various railroad test departments and results have not yet been released for publication.

The following figures may, however, be of interest. On the Pennsylvania between Enola, Pa., and West Morrisville, N. J., a distance of 132 miles, against a ruling .3 per cent grade, an average of three runs with 6,241 tons showed 41 lb. of coal per 1,000 gross ton-miles, and one run with 6,589 tons showed 39 lb. per 1,000 gross ton-miles. On the Baltimore & Ohio, on the 118 miles between Connellsville, Pa., and New Castle, Pa., a run with 3,346 tons gave 60 lb. of coal per 1,000 gross ton-miles, while with 4,068 tons the coal consumption was 53 lb. per 1,000 gross ton-miles. On the Chicago, Burlington & Quincy 7,080 tons were hauled 120 miles from Centralia, Ill., to Beardstown, with a coal consumption of 53 lb. per 1,000 gross ton-miles. From Beardstown to Galesburg 7,528 tons were hauled with a coal consumption of 57 lb. per 1,000 gross ton-miles. Our observations lead us to believe that when compared with well designed modern locomotives on runs of this character, locomotive No. 60,000 will show a saving of from 10 to 20 per cent in consumption of coal per ton-mile.

I believe that the results so far obtained are such that in future any locomotive designer who is aiming at the greatest possible power per unit of locomotive weight will be forced to give careful consideration to the possibilities inherent in high boiler pressure and long expansion.

APPRENTICES OF THE UNION PACIFIC at the Albina (Oregon) shops, tore down and rebuilt a locomotive in 30 days and rebuilt and repaired two steel freight cars in four days, in the first attempt the Union Pacific has made to use an entire force of shop apprentices in such a job. The apprentices celebrated the completion of the work on March 10 with ceremonies that included a christening of the locomotive.

# Frisco Authorized to Issue Common Stock

WASHINGTON, D. C.

THE Interstate Commerce Commission, Division 4, has authorized the St. Louis-San Francisco to issue \$15,096,240 of common stock, to be sold at not less than par and accrued dividends, to reimburse the treasury in part for capital expenditures, including construction of a line from Aberdeen, Miss., to Kimbrough, Ala., and rehabilitation of the line of the Muscle Shoals, Birmingham & Pensacola. Commissioner Eastman dissented, saying that "heavy overcapitalization" is indicated by the disparity between the capitalization and the commission's tentative valuation, as well as by the capitalization per mile. The order approved by the majority contains a provision that any capital expenditures made from applicant's treasury as reimbursed by the proposed issue of common stock shall not subsequently be capitalized. The company had filed an alternative application for authority for an issue of preferred stock convertible into common, or for an issue of common but later stated its intention to issue common stock. Following is an abstract of the majority report and the text of Commissioner Eastman's dissenting opinion:

#### Majority Report

As bases for the proposed issue of preferred or common stock the applicant submits a summary of capital expenditures made by it between January 1, 1922, and December 31, 1925, amounting to \$22,055,223, against which expenditures we have heretofore authorized the issue of prior-lien bonds to the extent of \$15,506,400, leaving a remainder of \$6,548,823 of expenditures for which reimbursement is sought by the issue of stock. Besides the foregoing the applicant shows expenditures of \$3,072,638 for additions and betterments made during 1926, for which it seeks reimbursement for one-third thereof by the issue of capital stock. The applicant also shows that it proposes to expend during 1927, including certain expenditures which will be carried over into 1928, a total of \$11,796,491 for additions and betterments, construction of a line of railroad from Aberdeen, Miss., to Kimbrough, Ala., and rehabilitation of the line of the Muscle Shoals, Birmingham & Pensacola. Part of the expenditures for these projects will be provided for by the issue of capital stock.

Under the applicant's articles of association its preferred

Under the applicant's articles of association its preferred stock may be issued to the total amount of \$200,000,000, in such series, having such characteristics, and carrying such rates such series, having such characteristics, and carrying such rates of dividends not to exceed 7 per cent per annum, as determined by the board of directors. In accordance with such provisions there has been created series B-preferred stock. This series will be noncumulative as to dividends and has no preference as to assets in case of liquidation, will be redeemable in whole or in part on the first day of any calendar month at \$110 per share and accrued dividends, and will be entitled to dividends, when declared at the rate of 6½ per cent per annum. There is to be indorsed on the series-B stock certificates a legend granting to the owner thereof the right to convert such shares of stock into the common stock of the applicant at the rate of 9 shares of common stock for each 10 shares of preferred stock, series B. The authority to issue \$13,586,616 of common stock, which the applicant herein seeks, is to enable it to carry out the conversion privilege proposed to be accorded to the holders of series-B stock.

The applicant proposes to offer the series B or common

holders of series-B stock.

The applicant proposes to offer the series B or common stock to the holders of its common stock for subscription at par and accrued dividends in the ratio of 3 shares of new stock for each 10 shares of common stock. The articles of association provide that the holders of preferred stock have no right to subscribe to any shares of common or preferred stock which the applicant at any time may issue or sell.

The applicant represents that it has not made any contracts, underwritings, or other arrangements in connection with the issue of the series B or common stock. It proposes to enter into an agreement with Speyer & Co., and J. & W. Seligman & Co. for the underwriting of such stock at the same price as offered to the holders of common stock, and to pay a commission of not exceeding 2½ per cent of the par value of the stock underwritten.

The applicant advises it has satisfactory assurances that the

proposed issue of common stock can be underwritten and therefore will issue common stock. The authority herein granted will be limited to the issue of common stock.

The relation existing between the applicant's capitalizable assets and capital liabilities has been considered in a number of the proceedings in which we have authorized the applicant to issue securities. While it appeared that the ledger value of the assets was greater than the liabilities, we expressed the opinion that, pending the final valuation of the applicant's property, too great weight should not, for reasons stated in our reports in those proceedings, be given such comparison. We also stated that the issue of certain securities, as then proposed, and the application of the proceeds thereof for capital purposes was not objectionable provided the newly acquired capital assets were not made the subject of future capitalization. No change has occurred in the applicant's financial structure that would warrant a modification of our views as expressed in the reports mentioned. Accordingly, our order herein will provide that mentioned. Accordingly, our order herein will provide that a y capital expenditures made from the applicant's treasury as

a. y capital expenditures made from the applicant's treasury as reimbursed by the proposed issue of common stock shall not absequently be capitalized.

We find that the proposed issue of common stock by the applicant as aforesaid (a) is for lawful objects within its exporate purposes, and compatible with the public interest, which are necessary and appropriate for and consistent with the proper performance by it of service to the public as a common carrier, and which will not impair its ability to perform that service, and (b) is reasonably necessary and appropriate for such purposes. priate for such purposes.

#### Commissioner Eastman Dissented

EASTMAN, Commissioner, dissenting:

Railroad financing by the issue of stock rather than bonds is greatly to be desired, but there are reasons of compelling force which should lead us to disapprove the issue of stock proposed in this case.

It is of parameters

It is of paramount importance in the public regulation of security issues to keep faith with investors. As a general principle investors have a right to expect, when they purchas shares of stock the issue of which we have authorized, that we will not later deny the carrier an opportunity to earn reasonable dividends on that stock. There may, of course, be exceptional cases to which this rule should not apply. For example, in the case of reorganizations where no adequate information was available in regard to the value of the property for rate-making purposes, we have approved new issues of securities merely upon the ground that they would bring bout an improvement in financial structure, at the same time making it clear that no opinion was expressed or implied as to the telation of these new issues to the value of the underlying property. But no occasion here exists for an exception to the general principle. is of paramount importance in the public regulation of

property. But no occasion here exists for an exception to ingeneral principle.

The possibility of marketing this new stock at par has been
created by the declaration of dividends upon the outstanding
common stock at the rate of 8 per cent. Investors will buy
the new stock in the expectation that dividends of from 6 to
8 per cent can be and are likely to be declared regularly in
the future. Clearly no approval by this commission can furnish
any guaranty of future earnings, but it seems to me equally
clear that we ought not to authorize the issue if there is substantial reason to believe that the opportunity to earn the an-

clear that we ought not to authorize the issue if there is substantial reason to believe that the opportunity to earn the anticipated dividends may at some future time be lawfully denied. Such reason exists. The value of applicant's property for rate-making purposes has not been finally determined, but a tentative valuation has been served. Applicant has protested against that tentative valuation and I realize that many changes may be made before value is finally determined. The disparity may be made before value is finally determined. The disparity hat ween tentative value and capitalization, however, is so great as to put us on guard. Heavy overcapitalization is indicated by this disparity, and it is also indicated by the amount of the capitalization per mile of road. Subsequent valuation proceedings may show that no overcapitalization actually exists, but in the meantime the indications point so strongly in that direction that they ought not to be disregarded.

Under the circumstances the chances that investors may be misled to their hurt are so great that we ought not, in my judgment, to authorize the issue of additional common stock.

THE "TEXAS" the locomotive which was used by confederate soldiers in pursuing the noted Andrews raiders, is to be placed on permanent exhibition in Grant Park, Atlanta, Ga. At Chattanooga, 137 miles away, stands the "General" the locomotive used by the Federal raiders when they were chased by the "Texas.

# Transportation Economies and Current Problems\*

Railways and other carriers—"Fair return" theory likely to increase rather than reduce cost of service to public

By Samuel O. Dunn Editor of the Railway Age

In a discussion of transportation economics before any body of intelligent and thoughtful persons it is hardly necessary to say, much less to emphasize, that to the greatest economic welfare and progress it is essential that good transportation, adequate to all reasonable demands, should be provided at the least practicable economic cost. This is true whether we have in mind transportation for the entire world, for an entire country, for a particular territory, or only a community. There are available four kinds of transportation—by air, by highway, by water and by railway.

Under present conditions the economics of railway transportation in this country cannot be intelligently considered without regard to competing or co-ordinated transportation by highway and by water. It is economically desirable that passengers and freight should at all times be carried by that means which affords the best combination of quality of service and economic cost. The true cost is the total expense incurred in rendering the service, whether shown entirely in the accounts of the carrier, or partly in the accounts of the carrier and partly

in the accounts of the government.

It is much easier to ascertain the true cost of transport by rail than by highway or water because in the cases of highway and water transport it is almost impossible to determine how much of the cost actually is incurred by the government and defrayed by the tax payers. This is a fruitful source of illusion regarding comparative costs of transportation. If governments would keep and report the transportation costs incurred by them as accurately and fully as they require those incurred by the railways to be kept and reported, it would be much easier to get a sound national transportation policy adopted and followed.

In spite of the gigantic development of other means of transport, especially by highway, it still remains true that the railways are our most important and essential means of transportation. If the operation of every ship and motor vehicle should be stopped for a month, great inconvenience, embarrassment and loss would be caused, but industry, commerce and finance would continue to function with a fair approach to normal. If the operation of every railway should be stopped for a month, industry, commerce and finance would not be able to function with any approach to normal.

#### Effect of Diversion of Traffic

One of the errors most commonly made in the discussion of transportation economics is that of assuming that the diversion of a certain kind or amount of traffic from the railways to other means of transportation will have no effect upon the economic cost that will be incurred and the rates that will have to be charged by the railways for the transportation of their remaining traffic. For

example, almost nobody apparently realizes the increase in the cost of handling each unit of passenger and freight business by rail that has been caused by the diversion of passenger business to highways and of freight business to the Panama Canal route. Nevertheless, this effect is easily traceable.

The railways operated passenger cars six per cent more miles in 1926 than in 1920, and carried 25 per cent less passengers one mile. Conditions and public sentiment made it impossible to reduce the service rendered in proportion to the loss of business. Probably they could have handled as much passenger business in 1926 as in 1920 without furnishing any more passenger car service in 1926 than they did with virtually no increase in total operating expense. The expense per unit of traffic would then have been smaller, and total earnings from passenger business would have been \$340,000,000 greater.

Most of the freight that goes through the Panama Canal moves partly by rail, first in eastern territory, and then from the Pacific coast back to the interior, and avoids entirely the railways in the territory between Chicago and the Rocky Mountains, although they could handle more freight westbound with virtually no greater

total operating expense.

I am not contending that the traffic mentioned should not be moved by highway and by water. I am simply calling attention to the effect its diversion has had in preventing reductions that otherwise would have occurred in the cost of handling each unit of traffic by rail. The number of passengers carried by the railways per car has sharply declined. The railways in the middle west have lost freight business to the canal. They have facilities sufficient to handle both the kinds of business they have lost with virtually no additional operating expense. Therefore, because this business has been lost it costs more to handle each unit of traffic that has not been lost.

#### Waterways to "Relieve" Railways

Those who contend that an extensive system of inland waterways should be developed say that the railways should be relieved of what they call "bulky and unprofitable" traffic. But bulky traffic, such as coal, is not necessarily unprofitable. Whether carrying any kind of commodity is profitable or not depends not only on the rate per ton per mile it bears, but also on the number of tons loaded per car. In other words, it depends on earnings not per ton mile, but per car mile. A 15-ton carload of merchandise at a rate of 1½ cents per ton will yield earnings of 22½ cents per car mile. A 50-ton carload of coal at ½ cent a ton will yield earnings of 25 cents per car mile. The railways that handle bulky commodities in the largest volume usually rank high, other things being equal, in net earnings.

Another argument advanced is that railways must be

<sup>&</sup>quot;An address delivered before the Affiliated Technical Societies of Baston, Mass., on February 17, 1927.

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# TRUSCON



Some of the Railroads Using Truscon Products

# RailwayAge

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# The Key to Teamwork

MANY railway supply representatives travel continuously, calling upon railroad officers and cultivating or being of service to railway men. In many instances they received their early training in railway service and are keenly interested in railway improvements and progress. It means something, therefore, when a number of these representatives independently express the idea that there is a noticeable difference in atmosphere at places where supervisors' clubs or organizations are functioning, or where special means are taken to provide friendly contacts and understanding between the supervisors. Such organizations or arrangements, they claim, provide the key for solving the problem of securing teamwork and co-operation. Have you noticed this? Is it true? The claim is also made that if a spirit of understanding exists among the supervisors and foremen. it is bound to extend down and through the entire organization.

# The Public Be Pleased

THE railroads are looking constantly to the comforts and needs of their patrons. Nothing is being overlooked if it is in any way reasonable or if it appears that it will create in the public that glow of satisfaction which pays so well in good will. In short, the Golden Rule has been found again to be an excellent and com-mercially sound business policy. It is reported that one railroad intends to inaugurate the custom of serving tea to passengers on some of its limited trains. Another railroad is reported to have ordered the arms removed from the benches in its waiting rooms so that those who, tired with waiting through long hours, care to relax and stretch out on the benches, may do so with a greater degree of comfort than heretofore. These may seem like extreme examples of offering the public a bit of extra attention. They are evidence, however, that the railroads are studying carefully the desires and needs of their patrons.

# Suggestion for Passenger Coach Arrangement

SUGGESTION was made recently by a mechanical department officer for a possible improvement in passenger car design to which thought has evidently not been generally given. In a large proportion of all day caches the toilets are located at the ends of the car. This has been customary in passenger car construction for many years. Two objections have been raised to this standard location of the toilet room; namely, the lack of sufficient privacy at the entrance and the nuisance of having the toilets located over the trucks. It has

been suggested that day coach passengers would be better pleased if the toilets were located at the center of the car instead of at the end. This location has possibilities for a change in the aisle arrangement that will provide increased privacy at the entrance of the toilet rooms such as is obtained in Pullman construction, and it also removes the toilets from immediately over the trucks.

# High Pressure Transportation

 $O^{IL}$  fields have a way of developing at unexpected and unhandy places. Usually, too, the fields are brought in just at a time when the railroads in the vicinity are busy moving a traffic that is taxing the capacity of their lines. The Panhandle oil field in Texas was typical in all these respects. It developed 30 miles from the nearest railroad, which was the main line of the Panhandle & Santa Fe. Just at the time when that line was handling the heaviest traffic in its history thousands of cars of rush freight to and trom the oil fields were dumped upon it, almost without warning. Fortunately for the railroad and even more fortunately for the oil people interested, the Santa Fe has had to deal with numerous other oil rushes, all the way from Kansas to California, and the experience gained by its officers stood them in good stead in this instance. They knew what to do and how to do it. More important, they knew "when to do it," which, in the oil fields, is synonymous with "right now." The details of this remarkable performance are given elsewhere in this issue. They form an interesting and unusual record of producing transportation at high pressure and under handicaps, that reflects credit upon the entire railway industry.

# B. & O. to Paint Locomotives Green and Name Them

THE Baltimore & Ohio will receive next week from the Baldwin Locomotive Works twenty new passenger locomotives which will be painted olive green, striped with red and gold. This innovation is probably the most outstanding development in the general movement toward improved appearance of locomotives which has taken place since the Southern last year painted parts of some of its passenger locomotives in color. The new Baltimore & Ohio locomotives, in addition to being adorned with colors, will be named after the first twenty presidents of the United States. Details of the program are given in a news item elsewhere in this issue. The road announcs that the new color scheme was adopted to make the locomotives harmonize in color with the cars. The announcement says further that some of the pioneer locomotives of the road "were gaily bedecked

with the different hues of the rainbow," but that from 1878 the practice of making locomotives pleasing to the eye seems to have been abandoned. If this latter statement is true, and there will be few to gainsay it, then it would seem that history is tending to repeat itself. Not in many years have locomotives the country over presented such a pleasing appearance as they do at the present time and still further improvement may be noted almost daily.

# The Railroad as a Disciplinarian

NEWS that the Denver & Rio Grande Western has been able to persuade some of its more careless patrons to march to the ticket window and purchase the necessary pasteboard which was neglected when the patron boarded the train to ride "the blind," or, possi-bly, when he slipped across "the rods" with the thought that tickets for that space were not customary and so not needed, may be taken as being further evidence of the growing efficiency of railroad operation. "Cut down every possible loss of revenue" and "neglect no possible source of new revenue" might be said to be highly favored mottoes today. The road that is able to make the hoboes, who try to abuse it, buy tickets, is proving not only a wise business organization, but a good disciplinarian. When the "'Bo" finds that he is made to pay for his uncomfortable form of transportation, he will be likely to pass up that particular road as one of his favorites or, in time, may learn to avoid the railroads altogether.

# Strikes in Public Utilities Called Poor Labor Strategy

PROFESSOR HAROLD J. LASKI of the University of London, who is well known as a student of the labor movement and sympathizer with the socialistic aims of British organized labor, in a recent summary of the general strike fiasco in England (New Republic, March 2) has reached some rather far-reaching conclusions. The most important of them, it seems to us, is the following:

It is, at that, dubious whether the unions concerned in public utilities, e. g., railroads, mines, electricity, are the front line trenches. Their stoppage is spectacular. But the services they perform are so necessary that modern government either knows how to run them directly, or can, by foreign purchases, replace the goods they supply.

Professor Laski is not a disinterested academist. Rather his career has been one of frank championship of the radical aims of British labor. When, therefore, he in the fullness of his study and experience admits that strikes which threaten the continuous operation of public utilities—railways, mines, electric power—are fore-doomed in the long run to failure, his opinion is worthy of attention; and if his conclusions hold true in a country like Britain where labor is strongly entrenched, how much more applicable are they under conditions which obtain on this continent!

# Eight Lessons in Courtesy

**E**<sup>V</sup>ERY wise superintendent would be glad if he could commend employees at least as often as he censures them. To carry out such an idea as regards individual employees is practically impossible; for in the nature of the case exceptional things (misconduct) call for com-

ment, and normal things (good conduct) do not. Getting away from the individual and considering thousands of men as a whole, we go to the other extremeby a New Year's circular we commend with all sincerity the good conduct of everybody, while overlooking everything that has been done amiss, as well as all laziness, lack of loyalty and other deficiencies. In the admittedly difficult task of maintaining a proper balance in this element of discipline there is and will continue to be ample room for the exercise of ingenuity. This is true notwithstanding the noticeable improvement that American passenger trainmen have made in their behavior in recent years. As an interesting experiment tending to make employees intelligently interested in being commended, we print in another column a circular on good manners recently issued by Harry W. Forman of the Western Pacific. It speaks for itself and needs no introduction. Not the least of the virtues of such action by the Western Pacific is the promulgation of this bit of good advice through an officer who comes into frequent and intimate contact with the trainmen and to whom they can talk with freedom.

# Indifference Toward Bus and Truck Legislation Is Dangerous

 $m{B}^Y$  aiding in the passage of regulatory measures, or in the prevention of the enactment of unfairly favorable legislation, the railways can protect themselves in a measure against competition of the "cut-throat" variety from buses and trucks. It is surprising that some railways are apparently indifferent toward the legislative measures affecting the highway carriers that come up for consideration and possible enactment in the states where they do business. As a case in point, the situation in Ohio may be referred to. Two bills are pending in the Ohio legislature which, if passed, will encourage cut rates among bus and truck operators. These laws are sponsored by a combination of bus lines of state-wide proportions, the aim of which seems to be the securing of a monopoly of the business of transportation for hire over the highways of the state. Most of the railways in Ohio are strongly opposing the passage of the measure, and there seems to be little prospect of its enactment into law at the present time. A few railways, however, have seemed to be indifferent toward the matter. Such an attitude may well be dangerous. Through consolidations and other forms of pooling of interests, the independent bus and truck operators are becoming stronger and stronger, as is the influence that they wield. Only through unanimous, united effort can the railways hope to continue to protect themselves and their business from inimical legislation of the sort now pending in Ohio.

# The Way Freight

THE movement of traffic to and from local stations has shown an increase at least commensurate with that of traffic in general. As a result, way freight trains have become an increasingly important factor in division operations. Proper supervision of way freights not an easy task. Once they have left the terminal their operations are largely controlled by the conductors. The practice followed on most roads of superintendents, trainmasters and other officers riding the local freights is a good one, and serves a double purpose. In addition to enabling the officers to supervise conditions at

local stations, it also enables them to observe the operation of these trains. This is important, since there are many patrons of the railroad whose only intimate contact with a railway is with the agent and the way freight conductor. These patrons are in the smaller towns, where, in many cases, the changing sentiment towards railroads has not yet penetrated, and the opinion in which the railroad is held rests to no small degree with the way freight crew. Then, too, the way freight train, if improperly handled, is a fertile source of overtime, of fuel waste, and of equipment waste, all of which have an adverse effect on the transportation costs of the division. By co-operation between the despatcher and the way freight conductor, many minutes may usually be saved on each run and, with the increased unit costs of transportation, every minute counts.

# Net Railway Operating Income

A CCOUNTANTS are frequently criticized on the ground that when they set up the figures for a business they are unable to express the results of the activity of a departmenet or a company so that others can obtain an entirely adequate picture of exactly what the figures mean. Thanks to the Interstate Commerce Commission and its requirements of accounting standardization, this criticism is probably less applicable in the railroad industry than in any other. Nevertheless, we have by no means reached perfection. Incontrovertible proof of this is found in the fact that there are still a surprisingly large number of railroads that do not show in their annual reports the all-important item of net railway operating income or net after equipment and joint facility rents. Some years ago-first when the Interstate Commerce Commission required this item to be shown in the monthly earnings reports and then more particularly after the passage of the Transportation Act -more and more carriers decided to indicate this item in their annual reports to stockholders. Then, for some reason, retrogression succeeded progress and in recent years the number showing the figure of net railway operating income has become less rather than greater.

Net railway operating income as a unit is so important that it is defined in the Transportation Act. It represents the amount that is used in figuring the return on railway property and which, for the carriers as a whole or by groups, is supposed to equal 5¾ per cent of the property investment and, for the individual carrier, is supposed to be recapturable to the extent of one-half of any excess over 6 per cent. To the stockholder or the analyst it has its greatest value because this is the item that is reported monthly to the Interstate Commerce Commission and given wide publicity in the financial columns. It would seem desirable also that it should be reported at the end of the year in the annual report to the stockholders.

# Acts of Heroism Rewarded

EROES may be born or made. Heroism may be an act performed voluntarily as a result of training or environment, or it may be an involuntary and spectaneous reaction to an impulse. In the former case, the individual acts with the impending danger to himself in mind, while in the latter he acts without consideration of the consequences. In either instance, acts of heroism among employees should be rewarded by the management, for such action promotes closer relation-

ships between employees and management, since most people are hero worshippers and approval of a heroic act by the management is in keeping with their own reactions. In addition, the saving of human life or the prevention of accidents benefits both employees and management

Few medals have been awarded to railway employees for acts of heroism. Among these the Pennsylvania established the practice of recognizing acts of unusual bravery through the awarding of medals in 1922 and two men received medals in 1923, 27 men in 1924, and 24 men in 1925. The Medal of Honor Act passed by Congress in 1905 provides for the awarding of medals for acts of valor among railway employees by the President of the United States upon the recommendation of the Interstate Commerce Commission. To date 25 such medals have been awarded, the latest being to C. M. Giblin, a brakeman on the Illinois Central, for saving the life of a woman on September 29, 1925, at New Orleans, La

More recently a total of four medals were awarded, to employees of the Chicago, North Shore & Milwaukee, the Chicago Rapid Transit Company and the Public Service Company of Northern Illinois, for the saving of human life during 1926, the award being instituted by Britton I. Budd a year ago among employees of the companies of which he is president. Three of the incidents recognized by these medals occurred out of the line of duty, while none of those whose lives were saved was in any way connected with the organizations concerned.

# Commissioner Eastman Dissents

THE St. Louis-San Francisco is about to sell some common stock. It proposed first to sell preferred stock, but apparently came to the opinion that its credit was so excellent that it could just as well sell common. The amount is to be \$15,096,240 and is to be offered to present holders of common stock for subscription in the ratio of three shares of new stock for ten shares of old. The whole railroad world will join in congratulating the Frisco upon its remarkable prosperity. The road came out of receivership on November 1, 1916. For some time thereafter there was considerable concern as to whether the company could meet the interest on its income bonds. It did not begin to pay dividends on its non-cumulative preferred stock until November, 1924. The initial dividend on the common stock was paid only as recently as January, 1925, and then only at an annual rate of 5 per cent.

The rate was raised to 7 per cent with the October, 1925, payment and the present 8 per cent rate was established so recently that the first payment at the new rate will be on April 1, 1927. In 1926, furthermore, according to the preliminary earning statement, the road earned after interest charges and the dividends on the preferred no less than \$14.17 a share on the common stock. The new stock will be offered at par. Frisco common is now selling at about 110.

There is one discordant note. The Interstate Commerce Commission has approved the issue but Commissioner Eastman has dissented. It is quite likely that progress in public utility regulation is the greater for the progressive attitude and ability to think clearly and independently that Commissioner Eastman brings to his tasks, but might he not accomplish more if he did not say "no" quite so frequently? Everything the railroads propose to Division 4 surely cannot be so decidedly

wrong as would seem to be indicated by the large percentage of the decisions from which the commissioner finds it necessary to dissent.

# Individuality in the Design of Passenger Stations

A STUDY of railway architecture in America throughout the century of steam transportation history goes to show that railroad buildings have been no better or no worse than contemporaneous structures built by others. The scroll saw and turning lathe period left its stamp on frame passenger stations in the form of meaningless embellishment to about the same extent that it disfigured residences built at the same time. Similarly, advance in the architectural design of public buildings in large cities has been reflected in the improved design of passenger terminals. In general, therefore, it may be said that the railroads have done their share to improve the appearance of American cities. That they have not done more is the fault of the American people rather than of the railroads.

Architectural styles created in one part of the continent are so quickly copied or adopted elsewhere that a business block or a public building in Toronto, for example, is constructed along the same lines as one in Dallas, Texas. This tendency has largely bereft American cities of any individuality which may be expressed in passenger station design. There are, of course, exceptions to this rule, for example in certain sections of the East, where colonial models are frequently applied, and in the southwest where there is now an awakened interest in the old Spanish architecture which had all but succumbed to this standardizing process.

Railways have long recognized the advertising value of handsome passenger stations, particularly if they possess individuality. They have also learned to their sorrow the fallacy of endeavors to this end through the creation of freak designs. It is rather in the background of local tradition that the opportunity is offered for architectural expression in a way that will be most distinctive and at the same time entirely legitimate. Furthermore, such developments not only possess advertising value but also an appeal to local pride that is sure to react to the advantage of the railway.

# Operating Cut-Out Engines in Train Control Territory

I T IS particularly noticeable that in its last four or five final train control inspection reports the Interstate Commerce Commission has inserted requirements to the effect that non-equipped locomotives, or locomotives with the train control cut out, must not be run in road service in train control territory, unless double-headed behind a locomotive on which the train control apparatus is in service. These requirements indicate that the commission intends to follow up the maintenance and operation of train control equipment.

In one month recently, eight roads, with a total of 1.072 engines equipped with train control apparatus in service, cut out the device in 175 cases in a total of 24.755 trips, or, in other words an average of one cut-out in 142 trips. A report issued recently stated that one road with 32 locomotives equipped permitted 26 trips

to be made in 15 days with the equipment cut ont. These examples are, of course, extreme and do not represent the general standard of train control maintenance on the majority of the roads. They do, however, emphasize the importance of better maintenance of train control equipment on locomotives.

If the majority of the roads using a certain type of train control are securing satisfactory results, more attention must be given to the details of the tests on those roads where failures are more frequent. Information concerning tests to be made and the way to make them has been issued and is readily available. It remains for the railroads to make the tests. The best results are secured by making an inbound test to locate any trouble before the engine goes in the roundhouse so as to allow time for adjustment and repair, and then to make another test when the engine is ready to leave.

The situation may be summarized in the statement that "it can be done." As long as the roads have spent large sums of money for train control, the commission's requirement that this equipment be so maintained as to render the protection intended is reasonable.

# The Metric System

# On the Railroads

ONE of the most persistent campaigns of propaganda that has been promoted in recent years is that having for its objective the substitution of the metric system for our present system of measurements. Through its efforts a bill was introduced in the last Congress to establish this system by January 1, 1935. As a result of the opposition of the railways and others, however, no action was taken and the bill was never reported out of committee. Although it is therefore dead, its proponents are continuing their propaganda actively and as recently as the current month the statement appeared in the house organ of a large manufacturer that, "The United States during the present year will take final legislative action to place its merchandising on the decimal metric basis in weights and measures."

This campaign presents a conflict between theory and practice that should receive the serious consideration of executives of all industries. The metric system has much to commend it in theory. Its advocates ignore the fact, however, that another system of measurement is already established in this country and that industry has been developed in accordance with its units. It further ignores the fact that any change in our present standards of measurement will lead to chaos in industry. It was for this reason that the American Railway Engineering Association went on record in 1920 as opposing this change and it, together with the American Railway Association, presented testimony before the committee last year showing that the transition to the metric system would involve expenditures by the railways alone running into the hundreds of millions of dollars, while the confusion in records and the possibilities of error would continue for a long time.

Congress has adjourned and there is no further danger of legislation on this subject for several months. The railways in common with other industries cannot afford, however, to relax their vigilance as long as organizations promoting the metric system remain active, but must be prepared to meet any move that may be made by the advocates of this system until they are brought to the realization of the fact that their cause is hopeless.



The Baldwin High-Pressure, Three-Cylinder Compound Locomotive

# Locomotive 60,000 Test Results

Western Railway Club papers\* devoted to performance of Baldwin experimental high pressure compound 3-cylinder locomotive

By Lawford H. Fry

Metallurgical Engineer, Standard Steel Works Company, Philadelphia, Pa.

NE of the outstanding demands of present day railroading is for greater power per unit of loco-motive weight. A study of the development of the steam locomotive will show that growth in size, which at first was rapid, is now slowing down; that the earlier demand for greater power has developed into a demand for greater concentration of power; and that considerable advances in power concentration have been made in recent years. In the twenty years from 1904 to 1924 the horsepower obtainable per 100 lb. of locomotive weight increased by approximately 65 per cent. Representative figures for freight locomotives show that in 1904 the locomotive weight required to develop one horsepower was 175 lb. By 1924, this was reduced to 110 lb., while in 1926, locomotive No. 60,000 with which we are now concerned developed over 4,500 hp. with a weight of 457,000 lb., or one horsepower per 100 lb. of locomotive weight.

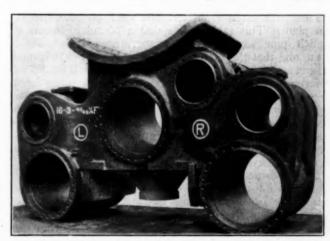
The complete story of the advance made in power concentration in the last twenty years would include many devices and appliances. Super-heaters and feedwater heaters play their part, but one of the major factors is increase in boiler pressure. Twenty years ago a boiler pressure of 180 to 200 lb. per sq. in. was high. Then pressures of 200 to 210 lb. became standard. In the last five years a large number of locomotives have been built for pressures of 240 and 250 lb. per sq. in.

This pressure of 250 lb, per sq. in, is probably about the maximum that can be used with the conventional type of boiler having flat firebox walls braced with stay-bolts. In the last few years, however, several experimental locomotives with special boilers have been built for pressures of 350 and 450 lb, per sq. in., and at least one European locomotive is working with a pressure of 880 lb, per sq. in. Locomotive No. 60,000 has a working boiler pressure of 350 lb, per sq. in.

In order to use steam at this pressure successfully two things are essential:

(1) an adequate boiler construction; (2) cylinders arranged to give a high ratio of expansion.

The necessity for the first is self evident, while the second follows from the fact that with long cut-off and high boiler presure, the exhaust pressure will be high and the steam will carry away energy which should be used in the cylinders. It is for this reason that locomotive No. 60,000 has been designed with compound



The Three Cylinders and the Saddle of Locomotive 60,000 Are All in One Casting

cylinders. The point is discussed below at greater length in connection with the details of the tests. [Mr. Fry here described by the use of slides various features in the construction of locomotive No. 60,000.—Editor.]

#### Results of Tests

The maximum evaporation obtained during extensive tests on the Altoona locomotive test plant was 69,695 lb. of steam per hour. The maximum equivalent evaporation was 84,184 lb. per hour and at this rate of operation the steam pressure and temperature were well maintained. As the rate of firing was only 135 lb. per sq. ft. of grate per hour, a higher rate of evaporation could undoubtedly have been attained if the locomotive had not

<sup>\*</sup> Presented at a regular meeting of the club held at the Hotel Sherman, Chicago, March 21, 1927.

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already reached the capacity of the testing plant. At a higher rate of evaporation, however, the boiler would have been unduly forced and the figures given represent probably about the maximum evaporation likely to be reached in service.

The boiler efficiency varies from about 70 per cent when 30 lb. of coal is fired per hour to about 52 per cent at the maximum rate of about 135 lb. of dry coal per sq. ft. of grate per hour. This efficiency is about that of a well designed boiler of conventional design.

Study of the way in which heat is taken up by the boiler is permitted by measurements of the temperature at the center of the firebox, at the back flue sheet and in the smokebox. From these temperatures it is found that at a medium rate of evaporation the firebox takes up about 38 per cent of all the heat absorbed by the boiler, the evaporation flues about 52 per cent, and the superheater about 10 per cent. This distribution of heat absorption is only slightly affected by the rate of operation

Before showing the results obtained with locomotive No. 60,000, the general question of the use of high pressure steam in locomotive cylinders should be examined. In the first place it must be recognized that with a reciprocating locomotive two limiting conditions will obtain, irrespective of the steam pressure used. The first is that the temperature of the steam coming from the superheater will be about 650 deg. F., and the second is that exhaust must take place to the atmosphere. To see how these conditions affect the results obtained with various boiler pressures, consider the figures given in

#### Table I

Test 7907	Pressure	Temp.	Heat per lb.
Branch pipe Exhaust pipe	322 lb. per sq. in. 11 lb. per sq. in.	652 deg. F. 248 deg. F.	1,338 B.t.u. 1,164 B.t.u. 174 B.t.u.

These are taken from test No. 7907 on the Altoona test plant. This table shows that a pound of steam at branch pipe pressure and temperature carried 1,338 B.t.u. and that the same pound of steam at exhaust pipe pressure and temperature carries only 1,164 B.t.u. The difference of 174 B.t.u. represents the energy taken from the steam and converted into work in the cylinders, together with the heat lost from the cylinders. This loss is small so that the difference between the total heat in the branch pipe and the total heat in the exhaust pipe represents closely the work done by the steam in passing through the cylinders.

I am indebted for this idea to C. D. Barrett, assistant engineer of tests of the Pennsylvania, who pointed out that if the amount of steam passing through the cylinders is known the indicated horsepower can be determined without using an indicator, but by measuring the pressures and temperatures in the branch pipe and in the exhaust. In the test represented in Table I., each pound of steam loses 174 B.t.u. in the production of work and 49,763 lb. of steam pass through per hour, making a total of  $174 \times 49,763$  B.t.u. per hour converted to mechanical work. Now at the thermal equivalent of a horsepower is 2,547 B.t.u. per hour the above corre-

sponds to 
$$\frac{174 \times 49,763}{}$$
 = 3,400 cyl. hp. The horsepower

as determined by the indicator for the test in question was 3,411 which figure is in very close agreement with that calculated above from the heat at admission and exhaust

2,547

With superheated steam an increase in boiler pressure, when the temperature of the steam remains the same reduces slightly the amount of heat per pound of steam entering the cylinders. That is, the heat available

for conversion into work is less; therefore to obtain an increase in the amount of work done per pound of steam it is necessary to reduce the heat in the exhaust steam as the boiler pressure is raised.

In practice this result is secured if the release pressure or pressure at the end of expansion is maintained constant, while the admission pressure is raised. To do this the higher pressure steam must be given a higher ratio of expansion. If steam is to expand to a given release pressure, say 45 lb. per sq. in., from two different admission pressures, say 205 and 335 lb. per sq. in., more expansion is necessary from 335 than from 205 lb. to reach the same release pressure of 45 lb. This longer expansion converts more heat into work and thus the steam from the higher pressure has less heat at release although the release pressure is the same in both caes. This is illustrated in Table II.

#### Table II-One Pound of Steam at 650 Deg. F.

Expansion from 205 lb, per sq. in.  Pressure  At admission. 205 lb, per sq. in.  At release 45 lb, per sq. in.  After exhaust. 10 lb, per sq. in.  Energy converted to work = 1,346 — 1,171 = 175 B.t.u.	Heat 1,346 B.t.u. 1,212 B.t.u. 1,171 B.t.u.
Number of expansions = $\frac{7.71}{2.92}$ = 2.7	
Expansion from 335 lb. per sq. in.  Pressure At admission. 335 lb. per sq. in. At release 45 lb. per sq. in. After exhaust 10 lb. per sq. in. Energy converted to work = 1,338 - 1,122 = 216 B.t.u.  Number of expansions = - 3.7	Heat 1,338 B.t.u. 1,168 B.t.u. 1,122 B.t.u.

Here steam at an initial temperature of 650 deg. F. is assumed to expand adiabatically, that is, without loss or gain of heat, from two different admission pressures to a release pressure of 45 lb. per sq. in., and then to be exhausted at 10 lb. per sq. in. The admission pressures are taken at 205 adn 335 lb. per sq. in. respectively. The table shows that the steam expands 2.7 times in dropping to 45 lb. per sq. in., from 205 lb. per sq. in., and 3.7 times from 335 lb. per sq. in. At release the steam has a pressure of 45 lb. per sq. in. in both cases, but has 66 deg. F. superheat from 205 lb. per sq. in. and one per cent wetness from 335 lb. per sq. in. It is found, as shown in Table II, that the maximum heat extractable from each pound of steam in the cycle assumed is 185 B.t.u. from 205 lb. per sq. in. and 214 B.t.u. from 335 lb. per sq. in. That is to say the increase from 205 to 335 lb. per sq. in. makes possible an increase in efficiency of 15.7 per cent, but to obtain this the number of expansions must be increased from 2,7 to 3.7.

To sum up in general terms the results shown for a particular case in Table II, we may say that when steam is expanded to a given release pressure an increase in admission pressure will reduce the total amount of heat in the steam at release, but will require an increase in the ratio of expansion.

It should be noted that even without an increase in boiler pressure an increase in cylinder efficiency can be obtained by increasing the expansion but this will reduce the exhaust pressure and a limit is thus set to the increase in expansion possible by the fact that exhaust has to be made to the atmosphere so that the release pressure cannot be lowered indefinitely. Therefore, increase in boiler pressure offers the greatest opportunity for increase in efficiency. At the same time the use of higher pressures has the mechanical advantage that 'he power obtainable from a given cylinder volume is increased. Coming back now to locomotive No. 60,000 we note that the necessity for a high ratio of expansion led to the use of compound cylinders. A higher expansion than is usual could have been obtained in two cylinders by using special valves and valve motion, but on the

whole it seems simpler to use three cylinders and to compound them. The three cylinders have also the advantage of reducing by one-third the power to be transmitted by any one piston. With three cylinders decided on, the compounding adds no further complication.

#### Water Rate Curve Is Unusually Low and Flat

A curve showing the water rate is plotted in Fig. 1 in relation to the indicated horsepower. This curve is flatter than any similar curve obtained for a single expansion locomotive. For all cut-offs from 50 per cent in the high and 20 per cent in the low pressure cylinders to 80 per cent high and 50 per cent low, and for all speeds from 80 to 160 r.p.m. (15 to 30 miles per hour) the water rate lies between 14.2 and 15.2 lb. per hp. hr., and even at a 90 high 70 low cut-off the water rate is only 16.3 lb, at 15 miles per hour and 16.6 lb. at 22.5 miles per hour. Examination of the information available from published records shows that the best water rate on record for an American freight locomotive ranges from 15.5 to 19 lb., these figures being obtained with 250 lb. per sq. in. boiler pressure. The usual modern locomotive with a boiler pressure of 200 lb. per sq. in, and a possible full stroke cut-off will usually have a water rate ranging from 17 to 27 lb. per hp. hr. It is evident that in locomotive No. 60,000 the combination of high boiler pressure and compound cylinders gives a high degree of engine efficiency. maximum drawbar pull measured on the plant ranged from 70,000 lb. at 15 miles per hour to 35,000 lb. at 57.5 miles per hour. Tests made in road service with a dynamometer car have shown slightly higher figures at speeds above 15 miles per hour, and a maximum pull of 87,000 lb. in a stalling test.

#### Coal Consumption per Mile

In conclusion the curves in Fig. 2 are presented to show the coal consumed per mile for various combinations of drawbar pull and speed. These curves were de-

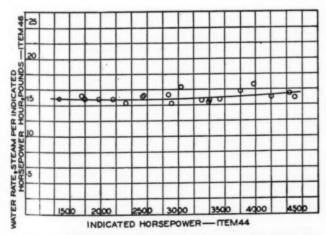


Fig. 1—Relation Between Water Rate and Indicated Horsepower

veloped by the Pennsylvania test department and are believed to summarize completely all the information which the operating department would wish to have regarding a locomotive. They show the price that must be paid in coal per mile for any desired combination of speed and drawbar pull.

Attention is called to the general flatness of the curves. For example, when 280 lb. of coal is burned per mile the speed can be increased from 15 to 25 miles per hour, that is, by 67 per cent, while the drawbar pull

is reduced only from 44,000 to 40,000 lb., that is, only by nine per cent.

#### Locomotive No. 60,000 Tested on Five Roads

Since leaving the locomotive test plant, locomotive No. 60,000 has been loaned for trial to five different railroads, has run between 15,000 and 20,000 miles in tests. The tests made confirm throughout the results obtained on the test plant. In fact, the dynamometer car records show slightly higher drawbar pulls than were obtained in the plant tests. Complete figures as to the results obtained on the road are not available as the tests were

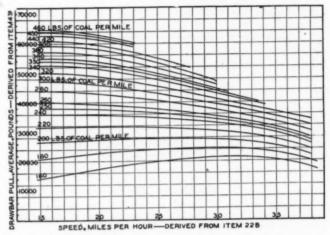


Fig. 2—Relation Between Drawbar Pull and Speed, for Various Rates of Coal Consumed per Mile

conducted by the various railroad test departments and results have not yet been released for publication.

The following figures may, however, be of interest. On the Pennsylvania between Enola, Pa., and West Morrisville, N. J., a distance of 132 miles, against a ruling .3 per cent grade, an average of three runs with 6,241 tons showed 41 lb. of coal per 1,000 gross tonmiles, and one run with 6,589 tons showed 39 lb. per 1,000 gross ton-miles. On the Baltimore & Ohio, on the 118 miles between Connellsville, Pa., and New Castle, Pa., a run with 3,346 tons gave 60 lb. of coal per 1,000 gross ton-miles, while with 4,068 tons the coal consumption was 53 lb. per 1,000 gross ton-miles. On the Chicago, Burlington & Quincy 7,080 tons were hauled 120 miles from Centralia, Ill., to Beardstown, with a coal consumption of 53 lb. per 1,000 gross ton-miles. From Beardstown to Galesburg 7,528 tons were hauled with a coal consumption of 57 lb. per 1,000 gross ton-miles. Our observations lead us to believe that when compared with well designed modern locomotives on runs of this character, locomotive No. 60,000 will show a saving of from 10 to 20 per cent in consumption of coal per ton-mile.

I believe that the results so far obtained are such that in future any locomotive designer who is aiming at the greatest possible power per unit of locomotive weight will be forced to give careful consideration to the possibilities inherent in high boiler pressure and long expansion.

APPRENTICES OF THE UNION PACIFIC at the Albina (Oregon) shops, tore down and rebuilt a locomotive in 30 days and rebuilt and repaired two steel freight cars in four days, in the first attempt the Union Pacific has made to use an entire force of shop apprentices in such a job. The apprentices celebrated the completion of the work on March 10 with ceremonies that included a christening of the locomotive.

# Frisco Authorized to Issue Common Stock

WASHINGTON, D. C.

THE Interstate Commerce Commission, Division 4, has authorized the St. Louis-San Francisco to issue \$15,096,240 of common stock, to be sold at not less than par and accrued dividends, to reimburse the treasury in part for capital expenditures, including construction of a line from Aberdeen, Miss., to Kimbrough, Ala., and rehabilitation of the line of the Muscle Shoals, Birmingham & Pensacola. Commissioner Eastman dissented, saying that "heavy overcapitalization" is indicated by the disparity between the capitalization and the commission's tentative valuation, as well as by the capitalization per mile. The order approved by the majority contains a provision that any capital expenditures made from applicant's treasury as reimbursed by the proposed issue of common stock shall not subsequently be capitalized. The company had filed an alternative application for authority for an issue of preferred stock convertible into common, or for an issue of common but later stated its intention to issue common stock. Following is an abstract of the majority report and the text of Commissioner Eastman's dissenting opinion:

#### Majority Report

As bases for the proposed issue of preferred or common stock the applicant submits a summary of capital expenditures made by it between January 1, 1922, and December 31, 1925, amounting to \$22,055,223, against which expenditures we have heretofore authorized the issue of prior-lien bonds to the extent of \$15,506,400, leaving a remainder of \$6,548,823 of expenditures for which reimbursement is sought by the issue of stock. Besides the foregoing the applicant shows expenditures of \$3,072,638 for additions and betterments made during 1926, for which it seeks reimbursement for one-third thereof by the issue of capital stock. The applicant also shows that it proposes to expend during 1927, including certain expenditures which will be carried over into 1928, a total of \$11,796,491 for additions and betterments, construction of a line of railroad from Aberdeen, Miss., to Kimbrough, Ala., and rehabilitation of the line of the Muscle Shoals, Birmingham & Pensacola. Part of the expenditures for these projects will be provided for by the issue of capital stock.

Under the applicant's articles of association its preferred stock may be issued to the total amount of \$200,000,000, in such series, having such characteristics, and carrying such rates of dividends not to exceed 7 per cent per annum, as determined by the board of directors. In accordance with such provisions there has been created series B-preferred stock. This series will be noncumulative as to dividends and has no preference as to assets in case of liquidation, will be redeemable in whole or in part on the first day of any calendar month at \$110 per share and accrued dividends, and will be entitled to dividends, when declared at the rate of 6½ per cent per annum. There is to be indorsed on the series-B stock certificates a legend granting to the owner thereof the right to convert such shares of stock into the common stock of the applicant at the rate of 9 shares of common stock for each 10 shares of preferred stock, series B. The authority to issue \$13,586,616 of common stock, which the applicant herein seeks, is to enable it to carry out the conversion privilege proposed to be accorded to the holders of series-B stock.

The applicant proposes to offer the series B or common

The applicant proposes to offer the series B or common stock to the holders of its common stock for subscription at par and accrued dividends in the ratio of 3 shares of new stock for each 10 shares of common stock. The articles of association provide that the holders of preferred stock have no right to subscribe to any shares of common or preferred stock which the applicant at any time may issue or sell.

tion provide that the holders of preferred stock have no right to subscribe to any shares of common or preferred stock which the applicant at any time may issue or sell.

The applicant represents that it has not made any contracts, underwritings, or other arrangements in connection with the issue of the series B or common stock. It proposes to enter into an agreement with Speyer & Co., and J. & W. Seligman & Co. for the underwriting of such stock at the same price as offered to the holders of common stock, and to pay a commission of not exceeding 2½ per cent of the par value of the stock underwritten.

The applicant advises it has satisfactory assurances that the

proposed issue of common stock can be underwritten and therefore will issue common stock. The authority herein granted will be limited to the issue of common stock.

The relation existing between the applicant's capitalizable assets and capital liabilities has been considered in a number of the proceedings in which we have authorized the applicant to issue securities. While it appeared that the ledger value of the assets was greater than the liabilities, we expressed the opinion that, pending the final valuation of the applicant's property, too great weight should not, for reasons stated in our reports in those proceedings, be given such comparison. We also stated that the issue of certain securities, as then proposed, and the application of the proceeds thereof for capital purposes was not objectionable provided the newly acquired capital assets were not made the subject of future capitalization. No change has occurred in the applicant's financial structure that would warrant a modification of our views as expressed in the reports mentioned. Accordingly, our order herein will provide that any capital expenditures made from the applicant's treasury as reimbursed by the proposed issue of common stock shall not subsequently be capitalized.

has occurred in the applicant's financial structure that would warrant a modification of our views as expressed in the reports mentioned. Accordingly, our order herein will provide that any capital expenditures made from the applicant's treasury as reimbursed by the proposed issue of common stock shall not subsequently be capitalized.

We find that the proposed issue of common stock by the applicant as aforesaid (a) is for lawful objects within its corporate purposes, and compatible with the public interest, which are necessary and appropriate for and consistent with the proper performance by it of service to the public as a common carrier, and which will not impair its ability to perform that service, and (b) is reasonably necessary and appropriate for such purposes.

#### Commissioner Eastman Dissented

EASTMAN, Commissioner, dissenting:

Railroad financing by the issue of stock rather than bonds is greatly to be desired, but there are reasons of compelling force which should lead us to disapprove the issue of stock proposed in this case.

It is of paramount importance in the public regulation of security issues to keep faith with investors. As a general principle investors have a right to expect, when they purchase shares of stock the issue of which we have authorized, that we will not later deny the carrier an opportunity to earn reasonable dividends on that stock. There may, of course, be exceptional cases to which this rule should not apply. For example, in the case of reorganizations where no adequate information was available in regard to the value of the property for rate-making purposes, we have approved new issues of securities merely upon the ground that they would bring about an improvement in financial structure, at the same time making it clear that no opinion was expressed or implied as to the relation of these new issues to the value of the underlying property. But no occasion here exists for an exception to the general principle.

The possibility of marketing this new stock at par has been created by the declaration of dividends upon the outstanding common stock at the rate of 8 per cent. Investors will buy the new stock in the expectation that dividends of from 6 to 8 per cent can be and are likely to be declared regularly in the future. Clearly no approval by this commission can furnish any guaranty of future earnings, but it seems to me equally clear that we ought not to authorize the issue if there is substantial reason to believe that the opportunity to earn the anticipated dividends may at some future time be lawfully depied.

stantial reason to believe that the opportunity to earn the anticipated dividends may at some future time be lawfully denied. Such reason exists. The value of applicant's property for rate-making purposes has not been finally determined, but a tentative valuation has been served. Applicant has protested against that tentative valuation, and I realize that many changes may be made before value is finally determined. The disparity between tentative value and capitalization, however, is so great as to put us on guard. Heavy overcapitalization is indicated by this disparity, and it is also indicated by the amount of the capitalization per mile of road. Subsequent valuation proceedings may show that no overcapitalization actually exists, but in the meantime the indications point so strongly in that direction that they ought not to be disregarded.

in the meantime the indications point so strongly in that direction that they ought not to be disregarded.

Under the circumstances the chances that investors may be misled to their hurt are so great that we ought not, in my judgment, to authorize the issue of additional common stock.

THE "TEXAS" the locomotive which was used by confederate soldiers in pursuing the noted Andrews raiders, is to be piaced on permanent exhibition in Grant Park, Atlanta, Ga. At Chattanooga, 137 miles away, stands the "General" the locomotive used by the Federal raiders when they were chased by the "Texas."

# Transportation Economies and Current Problems\*

Railways and other carriers—"Fair return" theory likely to increase rather than reduce cost of service to public

> By Samuel O. Dunn Editor of the Railway Age

In a discussion of transportation economics before any body of intelligent and thoughtful persons it is hardly necessary to say, much less to emphasize, that to the greatest economic welfare and progress it is essential that good transportation, adequate to all reasonable demands, should be provided at the least practicable economic cost. This is true whether we have in mind transportation for the entire world, for an entire country, for a particular territory, or only a community. There are available four kinds of transportation—by air, by highway, by water and by railway.

Under present conditions the economics of railway transportation in this country cannot be intelligently considered without regard to competing or co-ordinated transportation by highway and by water. It is economically desirable that passengers and freight should at all times be carried by that means which affords the best combination of quality of service and economic cost. The true cost is the total expense incurred in rendering the service, whether shown entirely in the accounts of the carrier, or partly in the accounts of the carrier and partly

in the accounts of the government.

It is much easier to ascertain the true cost of transport by rail than by highway or water because in the cases of highway and water transport it is almost impossible to determine how much of the cost actually is incurred by the government and defrayed by the tax payers. This is a fruitful source of illusion regarding comparative costs of transportation. If governments would keep and report the transportation costs incurred by them as accurately and fully as they require those incurred by the railways to be kept and reported, it would be much easier to get a sound national transportation policy adopted and followed.

In spite of the gigantic development of other means of transport, especially by highway, it still remains true that the railways are our most important and essential means of transportation. If the operation of every ship and motor vehicle should be stopped for a month, great inconvenience, embarrassment and loss would be caused, but industry, commerce and finance would continue to function with a fair approach to normal. If the operation of every railway should be stopped for a month, industry, commerce and finance would not be able to function with any approach to normal.

#### Effect of Diversion of Traffic

One of the errors most commonly made in the discussion of transportation economics is that of assuming that the diversion of a certain kind or amount of traffic from the railways to other means of transportation will have no effect upon the economic cost that will be incurred and the rates that will have to be charged by the railways for the transportation of their remaining traffic. For

example, almost nobody apparently realizes the increase in the cost of handling each unit of passenger and freight business by rail that has been caused by the diversion of passenger business to highways and of freight business to the Panama Canal route. Nevertheless, this effect is easily traceable.

The railways operated passenger cars six per cent more miles in 1926 than in 1920, and carried 25 per cent less passengers one mile. Conditions and public sentiment made it impossible to reduce the service rendered in proportion to the loss of business. Probably they could have handled as much passenger business in 1926 as in 1920 without furnishing any more passenger car service in 1926 than they did with virtually no increase in total operating expense. The expense per unit of traffic would then have been smaller, and total earnings from passenger business would have been \$340,000,000 greater.

Most of the freight that goes through the Panama Canal moves partly by rail, first in eastern territory, and then from the Pacific coast back to the interior, and avoids entirely the railways in the territory between Chicago and the Rocky Mountains, although they could handle more freight westbound with virtually no greater total operating expense.

I am not contending that the traffic mentioned should not be moved by highway and by water. I am simply calling attention to the effect its diversion has had in preventing reductions that otherwise would have occurred in the cost of handling each unit of traffic by rail. The number of passengers carried by the railways per car has sharply declined. The railways in the middle west have lost freight business to the canal. They have facilities sufficient to handle both the kinds of business they have lost with virtually no additional operating expense. Therefore, because this business has been lost it costs more to handle each unit of traffic that has not been lost.

#### Waterways to "Relieve" Railways

Those who contend that an extensive system of inland waterways should be developed say that the railways should be relieved of what they call "bulky and unprofitable" traffic. But bulky traffic, such as coal, is not necessarily unprofitable. Whether carrying any kind of commodity is profitable or not depends not only on the rate per ton per mile it bears, but also on the number of tons loaded per car. In other words, it depends on earnings not per ton mile, but per car mile. A 15-ton carload of merchandise at a rate of 1½ cents per ton will yield earnings of 22½ cents per car mile. A 50-ton carload of coal at ½ cent a ton will yield earnings of 25 cents per car mile. The railways that handle bulky commodities in the largest volume usua!ly rank high, other things being equal, in net earnings.

Another argument advanced is that railways must be

<sup>\*</sup>An address delivered before the Affiliated Technical Societies of Boston, Mass., on February 17, 1927.

relieved by waterway development because they are approaching the limit to which their capacity can be expanded. There is, in fact, no known physical limit to the extent to which the capacity of a railway can be expanded. Furthermore, other things being equal, the greater the density of traffic the lower is the cost at which each unit of it can be handled. It may be that the traffic diverted actually will be handled at a lower cost by water, but there always is a partial or complete offset to the saving thus made in the disability imposed upon the railways of making a reduction in their cost per unit of service that otherwise could be made.

Waterways in our northern climate are obstructed by ice during a part of the year. It is during this same part of the year that traffic on the railways usually is the heaviest, and that they encounter the greatest difficulties in handling it. They must provide enough capacity, if their service at all times is to be satisfactory, to handle all the traffic offered in the late fall, winter and early spring. If they do this, and part of the freight moves by water during the rest of the year, the railways during a great part of the year will have a large surplus capac-Thus, the fixed charges and maintenance expenses of all their facilities will continue while a large part of their capacity is unutilized. This actually occurs now, and the cost of providing this surplus capacity makes larger than it otherwise would be the cost of handling each unit of their traffic. This is another offset to the economies claimed for water transportation.

The things I have mentioned cause concealed losses in transportation about which apparently most people never think.

### Unproductive Improvements and Costs

Public demands for unproductive improvements increase railway costs. The best examples of such demands are those for the elimination of highway grade crossings and the construction of commodious and beautiful passenger stations which are made by people in both small The elimination of grade crossings, and large cities. where it is the only available means of securing safety, is desirable. But almost without exception when the railways pay for it, they increase their fixed charges without materially affecting their operating expenses. Most of the grade crossings in this country have been created by the opening of highways over railway lines. Therefore, it does not seem reasonable that the cost of separating grades should be imposed mainly or entirely on the railways. But to whatever extent the railways have to pay for it, the cost of rendering their service is increased. Commodious and beautiful passenger stations are desirable, but they cannot be provided without increasing the cost of service.

There are, in fact, few ways that service can be improved without increasing the total cost of rendering it. unless the additional cost is offset by investments of capital and improvements in operating methods which directly effect operating economies. The railways have received much praise for the remarkable improvement that has been made in their freight service within recent This improvement in service has not, however, been effected without the incurring of transportation costs that otherwise would have been avoided. During the last six years the number of tons of freight carried one mile increased above 71/2 per cent, while the number of miles that freight cars were moved increased above 24 per cent. This increase in freight car mileage was mainly due to an increase of 44 per cent in the number of miles freight cars were moved empty in order to so distribute them that they would always be available when and where shippers wanted them. It was this better distribution and the more rapid movement of cars that enabled the railways during the months of record breaking traffic in the latter part of last year to make the remarkable record of furnishing to shippers a daily average of 99.7 per cent of all the freight cars for which they made requisition. It cost a great deal, however, to move cars so many more miles empty.

### Capital and Operating Economies

The railways within recent years have been subject to influences such as I have mentioned tending to increase their overhead and operating costs. Their taxes have increased. They have lost a large amount of passenger business. Their freight business has increased, but the average rate they have received for handling it has declined. Nevertheless, the net operating income earned by them largely increased, and finally in 1926 they, as a whole, approximated for the first time the percentage of return to which the Interstate Commerce Commission seven years ago held that, under the provisions of the Transportation Act, they were entitled. It is unnecessary to say, in view of the facts mentioned, that the increase in their net operating income was entirely due to economies made in operation which much more than counteracted the influences tending to increase their costs.

To what were these large economies in operation due? They were due partly to increased co-operation of shippers in expediting the handling of cars; partly to more efficient work by employees; partly to improvements in operating methods made by railway managers. But the paramount cause was a large increase in their capital investment. Capital, when wisely invested in a railway plant, makes it possible to produce more ton miles and passenger miles of service without any corresponding increase, or an actual reduction, in the number of hours of labor and the number of tons of fuel and materials used and paid for.

The net increase in the investment in our railways during the last ten years was about six billion dollars. The increase in their passenger traffic was small, but in their freight traffic it was very large. To move this increased traffic they actually employed labor substantially less hours in 1926 than in 1916. If the number of hours of labor that had to be paid for had increased as much in proportion as the amount of traffic handled, the wage bill in 1926, at the average wage per hour actually paid, would have been about 800 million dollars greater than it was. If the amount of fuel and materials used had increased as much in proportion as the traffic handled, the increase in total expenses would have been many more millions larger than it was.

These and other constructive savings, which probably equalled the total net operating income earned either ten years ago or last year, were made possible by better, faster and more powerful locomotives, larger and stronger cars, better tracks, larger terminals and other improved facilities that were provided with the capital invested during this decade. That capital would not have been invested if those owning it had not expected they would be paid the interest rates stipulated in equipment trust certificates and mortgage bonds, or satisfactory rates of dividend on stock.

#### Regulation and Transportation Costs

We come now to a consideration of the most important economic problem involved in our prevailing policy of railway regulation. This is the problem of determining how much net return the railways should be allowed to earn, and of so adjusting their rates as to enable them to earn it. The mere statement of certain outstanding

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facts will show in what way, and why, this problem is

The total earnings of our Class I railroads last year were about \$6,450,000,000. We will divide the outgo from these earnings into two parts. The first consists of the outlays made for operation and taxes, which amounted to about \$5,200,000,000, or more than 80 per cent of the total earnings. The second part consists of the net operating income, which amounted to about \$1,231,500,000, or less than 20 per cent of the total earnings. The former part is more than four times as large as the latter part and therefore more than four times as important to the public that uses railway service and pays railway rates.

Now, then, what are we actually trying to do, by means of our present government transportation policy, to influence the cost to the public of transportation by rail? First, the government is helping prevent reductions in railway costs per unit of traffic by promoting the diversion of traffic from the railways to other means of This is stated, not in criticism, but transportation. merely because it is a fact that should be understood. Secondly, our various governments are increasing railway taxes, which amounted last year to about 400 million dollars. Third, the government is doing nothing to control railway wages, which amount to about 3 billion dollars annually, and are increasing. Fourth, the government is doing nothing to control the prices the railways must pay for fuel and materials, which are bought in the open market and cost about \$1,600,000,000 annually. In brief, insofar as government action affects costs of transportation that consume over 80 per cent of present railway earnings, it tends to increase these costs.

In what way does it affect the remaining less than 20 per cent, which appears in the accounts as "net operating income" and is used for paying interest and dividends or for direct investment in the properties? The most outstanding and paradoxical fact about our policy of regulation of railways is that, excepting as regards unfair discrimination in rates, it is postulated mainly, and in fact almost entirely, on the assumption that regulation can promote the public welfare best by preventing the net operating income earned by the railways from averaging either less or more than a "fair return upon a fair valuation." It is neither incorrect nor unfair to say that during the last twenty years its main purpose in practice has been, not to assure to the railways this so-called "fair return," but to prevent them from exceeding it, the result being that, on the average annually, they have fallen short of earning it.

Now, this principle of a "fair return upon a fair valuation" was originally enunciated as a legal and not an economic one. It was enunciated by the courts to prevent what they believed would be unconstitutional confiscation of property. Furthermore, the Supreme Court has held, not that it is the maximum, or even the average, but that it is the minimum, which railways and public utilities must be allowed to earn. Therefore, when, as a practical matter, the railways are restricted to it as a maximum, with the result that they fail to earn it even as an annual average, the regulating authority does not even conform to the legal principle which it has arbitrarily attempted to convert into an economic principle.

## Economic Consequences of "Fair Return" Theory

Let us consider to what economic consequences the application of the "fair return" principle of regulation tends to lead. In the long run the amount of capital invested in an industry, and the character of the securities issued to get it, will depend upon the rates of interest or

dividends that investors believe may reasonably be expected to be derived from the investment. They will buy the stocks of a railway at par if the net income on them promises to be sufficient to yield a dividend of perhaps 7 per cent. They may buy its bonds or equipment trust notes if it seems probable the railway will be unable to pay so high a dividend, but will be able to pay 5 per cent or more on its indebtedness. If it seems improbable that it will be able to pay what investors regard as either reasonable dividends or interest, they will not buy its securities at all. It will then be unable to secure any considerable amount of capital for enlarging or improving its property.

Plainly, what this means is that those who regulate the net return that railways may earn, indirectly, but no less effectively, regulate the flow of capital into the industry. When, before the war, they so regulated the return earned that it steadily declined, the flow of capital into the industry also steadily declined from more than one billion dollars in 1911 to less than 300 million dollars in 1916. While they have been so regulating it within the last five years that it has been increasing, the flow of capital into the industry has been increasing. Meantime they have directly and indirectly regulated the character of the securities the railways have been able to sell. When the return earned has declined, the proportion of the capital raised made by incurring indebtedness has increased. When the return earned has increased, the proportion of capital raised by the sale of stock has increased.

#### Regulation of Return May Hinder Economies

For reasons already indicated, those who regulate the return the railways earn, and thereby the flow of capital into the industry, also indirectly determine something else that is of far more importance than a small difference in the return earned. It is the wise and adequate investment of capital that enables railways both to increase and improve their service and to effect all the major economies in operation. Therefore, while the direct effect of undue restriction of the net return earned will be to save the public some part of the freight and passenger charges that finally become the net operating income, which is now less than one-fifth of the total earnings, its indirect but no less inevitable and far more important effect will be to hinder or prevent those improvements in the physical plant which are essential to rendering a larger and better service and to effecting economies in those operating outlays which are four times as large as the net operating income. To so regulate the net operating income as to hinder or prevent an adequate flow of capital into the railroad industry is to save at the spigot, and thereby cause many times larger losses at the bunghole.

Now, it is true, as already pointed out, that in past years a large investment of capital has been made in the railways, and that great improvements in service and large economies in operation that this has made possible have been effected. During the last decade the average hourly wage of labor has been increased 125 per cent; the taxes paid have increased much more in proportion; largely advanced prices for fuel and materials have been paid; and yet, with an average advance of only 50 per cent in its rates, our railway system has remained solvent, and last year earned the largest percentage of return since 1917. This is a good record; but unquestionably if the net return allowed to be earned during the last ten years had been larger, the capital invested in the railways would have been greater, and in consequence the economies in operation effected would have been so much greater that they would be able at present to give better service, or to pay even a higher average wage, or to

charge a lower average rate, and to earn a larger percentage of return upon their capital.

#### What Will Future Policy Be?

However, we are less concerned now with the past than with the present situation and with what our policy of railway regulation is to be in future. Most of the public, of railway labor leaders and employees, and even of our regulating authorities, seem to have no grasp or comprehension of the fact that the effect that will be produced on the interest and dividends the railways will be able to pay by the way in which the net return they may earn is regulated, will be of very minor importance compared with the effects that will be produced upon the kind of service they will be able to render, the average wage they will be able to pay and the average rate they will have to be allowed to charge. The way their net return is regulated will mainly de-termine in future, as it has in the last twenty years, the relative amounts of stocks and evidences of indebtedness they will issue, and thereby the financial strength and stability of the industry. It will mainly determine the amount of capital that will flow into the industry, which, in turn, will determine the kind of service that can be rendered and the economy with which this service can

It has been estimated that the improvement in railway freight service since the great car shortage of 1922 has made possible reductions in commercial inventories and other improvements in business methods that are worth two billion dollars annually to the people of the country. Whether this estimate is too large or too small, it has been worth a vast amount. The public welfare requires that there shall be made enlargements and improvements in railway plants which will render it possible to maintain this service.

Every railway executive and student of the subject knows, because of present conditions viewed in the light of past experience, that, if a sufficient amount of new capital can be obtained, improvements can be made in railway tracks and terminals, and that new equipment can be bought to replace that which is now comparatively unfit or actually obsolescent, with the result of effecting far vaster economies in the use of labor, fuel and material than those that heretofore have been achieved.

#### A Fundamental and Dangerous Error

The most fundamental and dangerous error in transportation economics ever made is that of those who assume that the way to get higher wages or lower rates is to restrict as narrowly as possible the net return that the railways may earn.

The question will naturally be raised as to the basis on which net return should be regulated and the percentage on that basis that should be allowed. For years our regulating authorities have been trying to get an answer to that question by purely legalistic means. They have been, and still are, trying to find out what is a "fair valuation" and what is a "fair return" on it. The farther they go the larger the valuation promises to be. Just as the war in Europe was coming on they commenced making a valuation under decisions of the courts and a federal law which required both cost of construction and present cost of reproduction to be ascertained and considered. Post-war being much higher than pre-war wages and prices, the Supreme Court now apparently holds that since it is present value and not original cost that must be ascertained, preponderant weight must be given in valuation to present cost of reproduction. On this basis the railways might gain an embarrassment of riches, of a large part of which they would subsequently be deprived if the estimated cost of reproduction should decline. A valuation of their properties having, however, been forced upon them over their opposition, they are naturally seeking a valuation such as the Supreme Court apparently requires to be made.

This illustrates what may be the result of seizing upon a purely legal principle and trying arbitrarily to employ it as an economic one regardless of the possible, and even probable, economic consequences. The question of what net return the railways should be allowed to earn in the interest of all concerned is a purely economic one, and we should never have had the gigantic problem of railroad valuation confronting us if the public and the regulating authorities had not made the fundamental mistake of arbitrarily assuming that the public interest would be promoted by restricting the net return the railways might earn as much as the narrowest possible interpretation of constitutional law would permit.

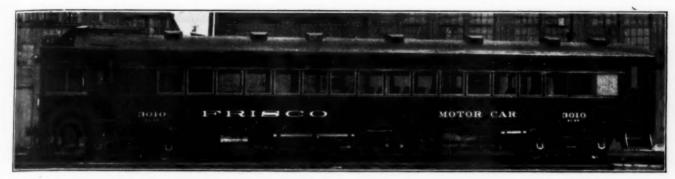
## The Sound Economic Principle

The sound principle always was, is now, and always will be that the railways as a whole, and each large group of them, should be allowed to earn a net return sufficient to enable them to compete on even terms with all other industries for the capital available for investment. It was bad for the nation, and cost it many billions of dollars in business losses, for too little capital to be invested in the railways in past years. It would be bad for the nation and for the railways themselves for an excessive amount of capital to be invested in them in future. The true measure of the return they should be allowed to earn is the the return earned in unregulated industries with which they must compete for capital. The fact that they are engaged in a public service will not influence a single investor to accept smaller interest or dividends on their bonds or stocks than he can get on the bonds or stocks of large industrial, commercial and financial concerns.

#### Economic Considerations

If the constitutional "fair return upon a fair valuation" were to be larger than the return ordinarily earned in large unregulated competitive industries it would be economically too large. If smaller, it would be economically too small. Railways, when privately owned and managed, are in most respects, economically speaking, mere commercial concerns, just as are factories or coal mines or mail order houses. Because of their nature they are legally subject to regulation; but when in regulating them we proceed from the assumption that, because they are legally subject to regulation, the profits they may earn should, in the interest of the public and their employees, be determined largely or wholly in disregard of ordinary economic considerations, we are sure to make blunders which in the long run will be injurious not only to their owners, but also to their employees and the public.

THE PENNSYLVANIA RAILROAD VOLUNTARY RELIEF DEPARTMENT now has a total membership of 199,406 employees, an increase over 1925 of 5,679. Benefits were paid during the year aggregating \$4,532,839, which were met out of dues received from members. In addition, superannuation allowances, totaling \$656,658, were paid to pensioned employees who were members of the Voluntary Relief Department, constituting additional income and supplementing their pensions. The company bore all operating expenses, including charges for surgical and medical attention, examinations, physical tests, etc., amounting in all to \$932,233.



The Second of Two Sykes Cars Recently Delivered to the St. Louis-San Francisco

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# Frisco Gets Mechanical Drive Gasoline Rail Cars

Two 275-hp. Sykes cars placed in service on 205-mile daily run in Oklahoma

N September, 1926, the St. Louis-San Francisco placed in service on a 205-mile daily run between Hugo, Okla., Ardmore and Hope, Ark., a more powerful and improved design of gasoline mechanical drive rail car with power unit and control built by the Sykes Company, St. Louis, Mo., and car body built by the St. Louis Car Company. A second similar car, recently delivered, is now in service running opposite to the first.

Each of these cars, having a light weight of 73,000 lb., length over bumpers of 62 ft. 3 in., and seating capacity of 62, is designed to develop a tractive force of 18,000 lb. in low gear, attain a speed of 60 miles an hour on straight, level track and pull a standard 50-ton coach on ordinary schedule runs at a gasoline consumption of 2 to 2½ miles per gallon. The engine holds six gallons of oil and operates an average of 1,600 miles per filling. An unusually high mechanical efficiency obtains, said to be 92 per cent from the engine to the rails in any of the three top gears.

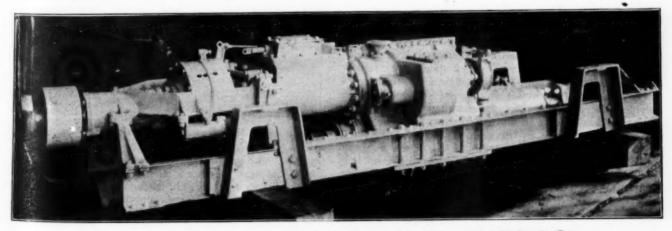
The drive is by a Sterling coast guard 6-cylinder gasoline engine, with 6½ in. bore and 7¾ in. stroke, developing 200 hp. at 1,200 r.p.m. and 300 hp. at 1,500 r.p.m., the latter being the governed speed. Dual intake

and dual exhaust valves of overhead design are provided, also double cam shafts mounted above the cylinder head and operating directly upon the valve mechanism. The crankshaft, of heat treated alloy steel drilled for high pressure lubrication, is provided with seven bearings. Two independent electric starting motors assure reliability in starting, as the engine is too large for hand cranking.

#### Operating Safeguards Provided

Safety devices are incorporated to protect the engine against mistakes in operation. For instance, the starting circuit is so arranged that the engine cannot be started unless the spark is retarded and the ignition switch turned on. The change gear mechanism is operated by air, the actual control of the shifting operation being timed by a centrifugal governor and the operator having nothing whatever to do with the actual shifting of gears except to select the gear ratio required and push a button.

A large tubular radiator covering half of the front of the car is used for cooling water, and a reserve tank of 30 gal. capacity is connected to the engine cooling system and mounted under a roof in the operator's cab.



View of Power Transmission Parts Which Are Mounted in a Compact Unit Under the Car

The engine cooling system and the car heating system are connected together. In ordinary cool weather, when heat is required in the car, the cooling water from the engine is circulated through the heating pipes and heats the car. The temperature of the car can be regulated by by-passing more or less water from the car heating system to the engine cooling radiator.

While standing out over night at terminals in cold weather the car heater is kept running. The heater is then cut in with the engine and radiator and keeps the power plant system warm and ready to start in the morning. This is a safeguard against freezing and other injuries possible in starting a cold engine.

### Engine Noises Muffled

The engine is mounted longitudinally in the car frame at the front end of the car, a housing being fitted around it to deaden the engine noises and deflect heat. Noises and heat from the usual type of inside mounted engines are minimized in this car.

Fuel is fed to the two carburetors from the main fuel tank under the car by means of a vacuum system, operated from an oil vacuum pump mounted on the engine. The design is such as to enable one carburetor to draw the fire from the other. Excessive back firing through careless operation, or shortage of fuel, quickly closes the air inlets and while preventing fire escaping in the engine room, automatically stops the engine.

A 32-volt, 1-kw. electric lighting generator is directly driven from the transmission. It has ample capacity to carry all the lights of the train, including the headlight, and is designed to keep the lighting batteries charged to capacity at all times. The generator cuts in at 300 r.p.m. of the engine, and generates current whenever the engine is running above that speed.

## Mechanical Drive to Both Trucks

The trucks are of standard four-wheel design, equipped with plain bearings. On the inside axle is mounted an unusually heavy set of spiral bevel driving gears made of alloy steel and heat treated. These gears are incased in a cast steel housing and mounted on Timken taper roller bearings. The drive is taken from the engine to the transmission by propeller shafts, and from the transmission at the center underneath the car by four-inch seamless steel tubular propeller shafts to both the front and the rear trucks. The universal joints run at virtually no angle under ordinary conditions, and are unusually heavy and sturdy.

The multiple plate clutch, of dry plate type, is self-contained, and has a capacity of approximately 200 per cent in excess of the duty required of it in the Sykes rail car. The clutch was designed by the Sykes Company especially for rail car service, and is provided with cooling fins and a two-minute adjustment.

The gear change box gives six speed changes, a separate box attached to the main gear change box providing reverse in each speed. The low speed is extremely low, having a road speed of approximately four miles an hour at the maximum engine speed, and is used only for emergency starts with heavy loads, or for moving heavy loaded cars in and around yards. The gears are in constant mesh in the main gear box. Bearings throughout the transmission are of S. K. F. self-aligning roller type. Ample space is provided in the gear box for lubricating oil, adequate cooling of the oil being assured by the addition of cooling ribs on the box.

The centrifugal fly-weight governor for shifting is mounted at the rear end of the main gear box and driven directly from the transmission shafts. Shifting into and out of speeds is accomplished by air operating cylinders and pistons. The shifting cylinders give a positive length of stroke, insuring proper position at delivery. The actual operation of the air shift is analogous to manual operation, except for being more positive. It is designed to be instantaneous and always to engage the gears at a time when the engaging members are revolving at substantially the same speed.

The shifting is entirely selective, it being unnecessary for the operator to go through the gears progressively. He can shift the transmission into neutral position at any vehicle speed, and at will can pick up the speed of the train by engaging the proper gear reduction by pressing a button. If the car speed is either too high or too low for the gear ratio selected by the operator when picking up the speed from drifting, the gear will not engage until engaging members rotate at the same speed. All the operator is required to know is the approximate gear ratio corresponding to the car speed, and the selection of this ratio will permit gears to engage without clash or surge.

Westinghouse brake equipment for single end control motor cars in steam railroad service is provided, with a type DH-25, two-cylinder air compressor of 25 cu. ft. per minute capacity and two 16-in. by 60-in. storage reservoirs. Drop handle ratchet type hand brakes are installed, one on the platform at the rear of the coach and one near the driver's seat.

# Pennsylvania Modifies Its Through Passenger Coaches

HE Pennsylvania Railroad has recently placed in through main-line service 74 passenger cars. The changes in which include a new interior color scheme, brighter lighting and larger toilet and washroom facilities. Better riding qualities have been obtained by the utilization of equalized trucks. The comfort of the seats has also been increased.

The ceilings of the new coaches are painted light ivory



Interior of the New Pennsylvania Main Line Passenger Cars

instead of the green hitherto used, and the power of the lamps has been increased 50 per cent. The result is a much brighter and more cheerful car. The sash of green glass, which, in the older extends the full length of the car just below the ceiling, has been eliminated and a continuous sheet of metal substituted. The light ivory paint used on the ceiling extends down over this metal

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sheet to the sides of the car. The body of the coach is done in brown and fawn, with stencilled designs at the

A washroom is provided at each end of the car, containing an enameled wash basin, a large mirror, and a

conveniently located soap and towel vendor.

The seat backs have been made 2 in. higher, to give better support to the head. The windows are equipped with exceptionally heavy weather stripping to prevent the discomfort of drafts in cold weather. At the same time, the windows have been so designed that any tendency of the sash to work open from the bottom is eliminated. A linoleum aisle strip has been laid the full length of the car, providing a softer and more comfortable walking surface, and adding to the general attractiveness of

To take care of the additional lighting load the new cars are equipped with four-kilowatt axle lighting

# Ford Consolidation Plan Rejected by I. C. C.

THE Interstate Commerce Commission has failed to approve the plan evolved by Henry Ford and his associates for reorganizing their railroad properties by consolidating the Detroit, Toledo & Ironton and its subsidiary, the Toledo-Detroit, into a new company, the Detroit & Ironton, organized by them and having a new capital structure and no "outside" stockholders. Mr. Ford has on several occasions objected to the idea of "unproductive stockholders" not included in the employees or management of an enterprise, and in this case his plan involved a method for removing outside partners by offering them \$104 a share for stock of the kind which he had bought several years ago for \$1 to \$5 a share. The plan was opposed, however, by the minority stockholders of the D. T. & I., who objected to parting with their shares and expressed a preference for being allowed to remain as partners of the Ford interests by receiving shares of the new company in exchange for those of the old.

As the commission dismissed the applications for authority for the acquisition of control by the new company on the technical ground that it involves a "consolidation into a single system for ownership and operation" not yet authorized by the law, it declared it unnecessary to discuss the collateral issues raised by contentions of the applicants and the interveners. say, however: "That there is discrimination against the minority appears from the fact that they are given no choice but to accept the cash equivalent of the value placed upon their stock in the manner described above."

The minority stockholders of the D. T. & I., who intervened in the case saying they wished to continue as partners of the Ford interests, are Theodore Beran and Jerome Tanenbaum, executors for Leon Tanenbaum, deceased, Benjamin M. Strauss, Edwin H. Nordlinger

and Herman Smith & Co.

The commission's report suggests that "if it is believed that public interest would be served by unified operation of the properties here in question, a proposal therefor should be submitted for our consideration in an application by the Ironton (D. T. & I.) for authority to acquire control, under lease, of the properties of the D. & I." The latter company holds the title to the various extensions built since the Ford interests acquired control of the D. T. & I., but the latter is still the operating company. The plan suggested by the commission, however, would not accomplish the elimination of the minority in the way proposed by the plan it declined to approve.

The plan was presented in three alternative forms, which gave the commission an opportunity to discuss the distinctions between different kinds of acquisition of control which are included in the interstate commerce act as amended by the transportation act.

The findings are as follows:

#### The Commission's Findings

1. That the proposed acquisition by the D. & I. of all rail-road properties, franchises, and assets (except the franchise to be a corporation, and certain cash) of the Ironton, including the properties of the Toledo, does not fall within the purview of paragraph (18) of section 1 of the interstate commerce act, and can not be accomplished thereunder.

That the proposed acquisition by the D. & I. of control of the Ironton and the Toledo, by purchase of stock and other securities and by purchase of all railroad properties, franchises, and assets (except the franchise to be a corporation, and certain cash), involves consolidation of such carriers into a single system for ownership and operation within the meaning of paragraph (2) of section 5 of the interstate commerce act.

3. That the application by the D. & I. and the Ironton for authority under paragraph (6) of section 5 of the interstate commerce act to consolidate their properties, including properties of the Toledo, into one corporation for ownership, management, and operation is prematurely filed. Merger of Subsidiary Companies with Boston & Maine, 76 I. C. C. 797.

4. The proposed issue of \$23,294,300 of capital stock and the proposed assumption of obligation and liability in respect of securities of the Ironton and the Toledo, by the D. & I., are not necessary or appropriate, or compatible with the public interest.

It follows that the applications recorded in Finance Dockets No. 4807 and No. 5149 must be dismissed, and that the application recorded in Finance Docket No. 5150 must be denied.

#### D. T. & I. Acquired by Ford in 1920

When the Ford interests, meaning, according to the report, Henry Ford, Mrs. Clara J. Ford and Edsel B. Ford, acquired control of the D. T. & I., in 1920 by purchasing a large part of its common stock for \$1 a share, preferred stock at \$5 a share and mortgage bonds at 60 to 78, there were certain minority interests which they were apparently unable to acquire so that as of March 31, 1925, the minority holdings amounted to 1.90 per cent of the \$6,500,000 common, 0.96 per cent of the ,989,948 preferred and 0.78 per cent of the 7,630,981 adjustment 5 per cent bonds. The Detroit & Ironton was then organized and at one time it filed an application for authority to lease the D. T. & I., but this was opposed by the minority and the plan was dropped.

Various extensions built were put in the name of the new company although operated by the D. T. & I., and a plan was worked out for the purchase of the properties of the D. T. & I. by the new company by exchange of its stock for that of the old company which it was to acquire from the Ford interests, leaving the D. T. & I. with no assets except the franchise to be a corporation and "such sum of money as shall represent the fair value on April 1, 1925, of all of the first party's outstanding capital stock not surrendered to it by the second party in pursuance of this agreement." The valuation engineer of the D. T. & I. made an apprraisal of the value of its properties at \$30,227,475 and the general auditor of the D. T. & I. on this basis computed the value of the stock at approximately \$104.27 per share. However the minority stockholders objected on the ground that this figure contained no allowance for good will or earning power and also on the ground that they had not been allowed to share in the proposed transaction upon the same terms as the majority.



Borger, Texas, a Town That Sprang Up Almost Overnight

# Santa Fe Handles Rush Oil Field Traffic Without Delay

Liberal expenditures for additional facilities enable road to provide service for growing territory

T is the custom in the oil fields to speak in terms of millions. Millions of barrels of oil are produced, millions of dollars are made and millions of dollars spent. Everything must be done at once, regardless of cost. The large and productive oil field in the Texas Panhandle has been no exception to this rule. In less than a year Borger, its metropolis, has grown from the open prairie to a city of 30,000 people. The territory is at present served exclusively by the Santa Fe, and in order for the road to keep pace with this development, it has been necessary for the railway officers to think and act in terms of millions.

The railroad has spent millions of dollars for improvements and for new lines, but it has also received millions of dollars of increased revenue to offset these expenditures. The station of Panhandle, Texas, for example, whose freight traffic has hitherto consisted almost exclusively of wheat and cattle shipments, has within the past year become almost equal to Chicago on the Santa Fe system in earnings, and at least two stations that did not exist six months ago have produced revenues of over a million dollars each since they have been established

#### The Existing Facilities

The Santa Fe serves West Texas through its subsidiary, the Panhandle & Santa Fe, a single track railroad. It is the low-grade main transcontinental freight line of the Santa Fe and is of standard main line construction with 110-lb. rail and rock ballast. This line leaves the main line at Newton, Kan., and passes through Wichita, Kans., and Amarillo, Texas, connecting with the line from Sweetwater and the Gulf ports just each of Clovis, N. M., and with the northern transcontinental line again a few miles west of Albuquerque. A 104-mile branch line of the P. & S. F. extends south from Canyon to Lubbock, where connection is made with the Gulf line. As the traffic on this branch was light, it was laid with 75-lb. rail and had several heavy grades. The line from Galveston, through Lubbock to Clovis, is of similar construction to the main line of the P. & S. F. and is capable of handling heavy traffic.

The usual traffic handled over the main line of the P. & S. F. consisted of perishables from California to the East, manufactured products and merchandise from the East to California, agricultural machinery and supplies for the rapidly developing farming districts in the Texas Panhandle and eastern New Mexico, and grain and livestock from the farming districts to the North and East.

The regular business of the railroad, entirely apart from the oil field traffic, was unprecedented in 1926. During one day, September 13, 1926, 482 carloads of grapes alone were moved over the line, en route from California to the East, while the wheat movement was four or five times what it was in 1925. On the Plains division (the division near which the oil development took place) wheat loading increased from 5,830 cars in 1925 to 16,975 in 1926. The live stock movement was also heavier than it has been at any time since the war. It was this heavy traffic line that was called upon to bear the brunt of the enormous oil field traffic.

## The Oil Field Development

The principal development of this field began near the Canadian river early in 1926, at a point 30 miles northwest of Panhandle and about 50 miles north of Amarillo. The production of oil rose from nothing to

Number of Loaded Tank Cars Shipped From Panhandle Oil Field Over Santa Fe.

	Total Loaded	Average Per Day
September, 1926	8,759	291.9
October, 1926		318.4
November, 1926		422.7
December, 1926		467.6
January, 1927		403.4
February, 1927	8,781	313.6
Total	67,092	

about 200,000 barels daily in less than a year and caused the heaviest increase in freight traffic ever recorded for a like period and a like territory. The oil produced is of a very high paraffin content and difficult and expensive to pipe. There were no pipe lines in the vicinity of the



field and none have been built as yet, although at the present time three pipe lines are under construction.

The fact that it was not possible to pipe the oil out of the field made it necessary for the railroad to handle all of it. This traffic rapidly assumed large proportions, as will be seen from the appended table showing the movement of oil from the field in the past six months, during which period the movement has averaged 370 cars per day, with a peak day of 648 cars.

The heaviness of the oil makes it susceptible to cold weather and the production is somewhat curtailed at present, but, with warmer weather, a much larger movement than hertofore is expected.

To understand the extent of this oil movement fully, it must be remembered that, for every car of oil handled outbound, it is necessary to handle an empty tank car inbound. Thus is will be seen that the movement of tank cars, loaded and empty, into and out of the oil field, amounted to 134,184 cars in six months, or well over 20,000 cars a month. This is in addition to the tremendous inbound movement of lumber, steel, pipe, machinery, merchandise and food supplies necessary in the building of a large oil field.

The Amarillo fold, of which the Panhandle field is a part, is said by geologists to be the largest single oil structure in the world. It is 120 miles in extent from east to west and 30 miles from north to south, and roughly follows the valley of the Canadian river, although the boundaries of the field have not yet been determined with any degree of certainty. There are already more than 1,100 oil rigs in the Borger district, which is the center of the present activity, and, since each rig has been estimated to require five carloads of pipe, lumber, steel and machinery in its construction, some idea of the magnitude of the freight movement into the territory may be obtained, for, in addition to the materials actually intended for oil rig construction, a vast amount of brick, stone, lumber, automobiles, foodstuffs and other miscellaneous freight was required to build and equip the city of 30,000 people that has sprung up in the field within the year.

### The Railway Flooded with Freight

The field followed the habit of its kind in developing at a point where there were no railroad facilities. The principal traffic-producing territory was 30 miles from Panhandle, Tex., the nearest railway station. This station was a comparatively unimportant one, where an agent and one clerk were employed. There were not over 1,000 inhabitants in the town and the business handled by the railroad consisted of livestock and grain outbound and a few carloads of merchandise inbound. This small country station became a hive of activity over night. The major portion of the oil field business, both inbound and outbound, had to be hauled by wagon

and motor truck to and from Panhandle over a road that was none too good. This was a cumbersome and unsatisfactory method. During rainy weather, the road became impassable and it was impossible to get materials into and out of the field.

The only facility at Panhandle when the rush began was a passing track. As may be readily imagined, it was not long until Panhandle and the whole Plains division was in danger of a complete tie-up. To relieve this situation, a large addition to the freighthouse at Panhandle was built and eight track miles of yard and storage tracks were laid. This construction was rushed to completion, but the increased business soon rendered further action imperative.

#### Construction of Oil Field Branch

Believing that the existing and potential business would justify the building of a branch line to the field (a



Oil Field Fire at Borger—Typical Loading Rack in Foreground

belief that was later found to be amply justified) steps were taken to secure authority for its construction. By use of the telephone and telegraph instead of the mails, the authority was secured in record time and construction of the branch was begun. Four months later, on October 16, 1926, the branch was opened for traffic.

This branch runs from Panhandle to Borger, in the oil fields, a distance of 30 miles. A few miles from Panhandle, the new line leaves the high plain and enters the broken country adjacent to the Canadian river, known locally as "the breaks." The locating engineers were successful in finding a ridge through the broken country leading almost directly to the oil field. As a result, this line is on a practically level grade and this low grade was attained without heavy cuts and fills, there being few of either on the line and none of any size. The line is laid throughout with 90-lb rail and is ballasted with rock.

The growth of industries along the new line has been so rapid that already there are more than 30 miles of industry and yard tracks on the branch, chiefly in the

vicinity of Borger. There are 53 industries already located on the Santa Fe tracks at Borger, principally oil companies and companies handling oil well supplies. There are 15 oil-loading racks, containing 248 risers for crude oil and 62 risers for gasoline.

The yard at Borger is nine miles long, and 24-hour switching service is necessary to take care of the industries in the district. The train yard tracks accommodate 450 cars and there are three public team tracks, with a capacity of 240 cars. Two 5,000 ft. tracks have just been completed for the storage of empty tank cars.

The oil-loading tracks are switched and pulled twice



Arrival of the First Train at Borger, Then Called Isom

and, in some cases, three times a day. The loading continues throughout the night. From four to six trains, carrying an average of 90 cars each are moved out each night. These trains are run down the branch to Panhandle and then over the main line to Amarillo without change of engines or crews.

All inbound business is brought into the newly built train yard at Panhandle and the trains to run up the branch are made up there. Empty tank cars, inbound for loading, come principally from the south and are made up into through trains for Borger in the Amarillo yards, avoiding the necessity of handling them through Panhandle yard. Upon arrival at Borger they are placed on the storage tracks allotted for that purpose, where they are available for distribution to the oil loading spurs as the occasion demands.

The personnel at Borger was very carefully selected. From previous experience in oil field territories elsewhere, the Santa Fe officers realized the vital necessity for thorough and competent supervision, particularly in the earlier stages of the rush, when conditions are very likely to become chaotic if competent supervision of operations is not maintained. An additional assistant superintendent of the Plains division was appointed, with particular invisidiation over the oil field territory.

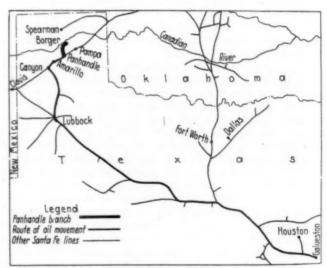
likely to become chaotic if competent supervision of operations is not maintained. An additional assistant superintendent of the Plains division was appointed, with particular jurisdiction over the oil field territory. and an assistant trainmaster makes his headquarters at Borger and is in charge of all operations in and around Borger. The local agent at Borger was transerred to that point from the Oklahoma oil fields and is thoroughly conversant with the methods of handling oil field traffic. The office force in the yard office consists of one day and one night yardmaster, two assistant yardmasters, six car clerks, three telegraph operators and three call boys. Five 10-wheel switch engines are employed at Borger and from 10 to 14 crews now are required there, depending upon the amount of business to be handled. A foreman and two machinists are employed to look after the switching power.

When the Borger station was opened for business on October 16, 1926, 22 men were put on in the depot and express office and since that time the station office force alone has been increased from 14 clerks to 27 clerks. Within the 30 days, the express business had outgrown the facilities provided for it and it was necessary to build a new express office, 140 ft. long and 50 ft. wide, while the freight house, 684 feet long, is now being widened 14 ft. to take care of the rapidly increasing merchandise business.

#### Further Construction Necessary

As the outbound movement of hundreds of cars of oil a day developed, yard and station facilities on the main line became overloaded and prompt action was taken to build new facilities to meet the traffic demands. At Amarillo, 11.2 track miles of additional tracks were built in the yard and other facilities are now being completed. During the month of November, an average of 30 trains a day moved in and out of Amarillo yard, 15 in each direction. Outbound cars averaged 634 west and 565 east outbound daily, while the daily inbound movement averaged 705 from the west and 588 from the east. This business was handled through a flat classification yard with nine 10-wheel switch engines, working three shifts.

In addition to the traffic from Borger, one of the oil companies has constructed a large tank farm at Kingsmill, a station six miles northeast of Panhandle, which made necessary the construction of a new freight house and 2,576 ft. of house track there. Also, at Pampa, 30 miles northeast of Panhandle, more activity was occasioned, some of it being due to the freight destined to points in the fields nearer to Pampa than to Panhandle, and the rest of it to the bringing in of a comparatively small oil field a few miles east of that station. This made necessary the construction of a new freight ware-



The Santa Fe Lines in Texas and Oklahoma

house and house tracks and 5.5 miles of additional yard tracks.

### Second Main Track Being Built

At Spearman, the terminus of a branch north of the main line, 1.5 miles of additional yard track was built to serve a considerable development in the field north of the Canadian river. Until recently there was no bridge at Borger to permit hauling of materials to and from the north field to the railroad at Borger which made it necessary that all freight going into and coming out of this field be hauled to and from Spearman, this being the nearest available station.

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Despite the rapidity with which these facilities were constructed, the flow of traffic continued to increase and taxed the new facilities to and beyond their capacity almost as soon as they were built. Most of the outbound oil (about 82 per cent) moves to the refineries in south Texas, including Texas City, Mexia and Galveston. As will be seen from the accompanying map, the short route to the Gulf coast was via the P. & S. F. through Amarillo to Canyon, thence over the branch line from Canyon to Lubbock, where connection is made with the Albuquerque-Galveston line. The heavy oil movement and the regular through traffic from California taxed the single track line between Canyon and Panhandle beyond its capacity and this condition is being relieved by the construction of a second main track between those stations, a distance of 45 miles. Work on this track has been in progress for some time and sections of it are already

Further development of the business at stations north of Panhandle on the main line has also necessitated additional main tracks in this direction, and work has been begun on 27 miles of second track between Panhandle and Pampa. When this work is completed, the line will be double tracked from Canyon to Pampa, 72 miles in all. This second main track is standard in every way, with heavy rail, rock ballast and automatic block signals. At Amarillo, where the Santa Fe crosses the Ft. Worth & Denver City and the Chicago, Rock Island & Pacific, an interlocking plant is being installed. All passing tracks between Canyon and Pampa are being lengthened to 6,000 ft., to take care of the long oil trains being operated in this territory.

The increased traffic southbound also made necessary extensive improvements on the line from Canyon via

switching and 21 passenger engines. By way of comparison, 12 switch engines were employed on the Plains division before oil developed. This number has now been increased to 23, assigned as follows: Amarillo, 9 engines, 20 tricks; Panhandle, 3 engines, 7 shifts; Borger, 5 engines, 12 tricks; Pampa, 1 engine, 2 shifts; Canadian, 1 engine, 3 shifts; Waynoka, 4 engines, 9 shifts. A number of heavy Mallet locomotives were regularly assigned to the division, and, with the addition of the new heavy power, trains averaging between 60 and 90 cars are handled regularly, thus simplifying operations a great deal by running fewer trains. As soon as the extension of the passing tracks is completed, it is planned to operate trains that will average nearly 100 cars.

The power on the Slaton division, which adjoins the Plains division on the south and includes the branch from Canyon to Lubbock, over which the heavy south-bound traffic of oil and northbound empty tanks moves, was also rendered inadequate by the sudden influx of business. The engine assignment on this division had to be increased from 39 freight and switch engines in January, 1926, to 53 in December, 1926.

#### Increase in Number of Employees

The number of employees on the Plains division, where the principal increase in traffic took place, also had to be greatly increased. In 1925, there were 2,723 employees on the division and this increased to 5,310 in 1926. The Santa Fe employed 1,153 persons in Amarillo in November, 1925 (including those in the Western Lines general offices), and, by November, 1926, this force had increased to 2,233 employees.

As far as train and locomotive employees are con-



The Freight Platform at Borger on a Busy Day

Planview to Lubbock, where it connects with the main line from the Gulf ports to Clovis, N. M., and the west. The Canyon-Lubbock line has been operated as a light traffic branch and it was necessary to replace its 75-lb. rails with new 90-lb. rails. Heavy rock ballasting was done and the grade was reduced in a number of places. The line is being given a thorough overhauling and when the work is complete it will be up to standard and capable of handling heavy traffic.

#### New Power Procured

The large increase in business placed a heavy burden on the existing power. Fifteen new heavy Mikado locomotives were purchased and assigned to road and yard service in the oil field territory. In addition, heavy power has been transferred from other divisions. In January, 1926, 70 freight and switching and 11 passenger engines were assigned to the Plains division and the present assignment on this division is 111 freight and

cerned, this presented a particularly difficult problem. In one period of two weeks, it was necessary to put on 176 additional men. There were, of course, on the Plains division, and the other divisions comprising the Western lines, a great many firemen and brakemen who were capable of becoming engineers and conductors, some of them having already qualified for these positions. These men were given an opportunity to transfer to the busy districts and gain their promotion. It was, of course, also necessary to hire a number of employees from the outside, but there was a sufficient number of old Santa Fe employees and enough efficient supervision to bring the morale of the newcomers up to Santa Fe standards, and there has been little, if any, difficulty in assimilating the new men in the new jobs without friction.

#### History of the Panhandle Territory

The development of northwest Texas has been very interesting and the discovery of oil in large quantities is

but another chapter of its colorful history. In 1886, when the Panhandle country was being fenced by the cattlemen, who had been using it as an open range, the Santa Fe started to build southwest through Oklahoma in the famous Cherokee strip. At that time the only commodity to ship was cattle, excepting a few carloads of buffalo bones, and supplies for settlers. In 1887, the road was completed to Panhandle, using sharp curves and steep grades. Business was good for two months in the spring, moving cattle to eastern pastures and for two months in the fall, moving beef to market, but during the other eight months, the earnings proved to be small.

In 1898 and 1899 the Pecos Valley line, owned by J. J. Hagerman, was extended from Roswell, N. M., to Amarillo. This road entered northwest Texas at Texico on the New Mexico border. Mr. Hagerman sold this road, extending from Amarillo through the Pecos Valley to Pecos, Texas, to the Santa Fe in 1899. This gave the Santa Fe a 200-mile line across the Panhandle, except for the gap between Washburn and Amarillo.

After the Pecos Valley line was acquired, the Santa Fe developed plans for a new low grade line to California by way of Amarillo and for a number of extensions on the plains. The management of the road believed that the plains had resources that in time would develop.

The line from Wellington, Kan., to Texico was rebuilt and a new line built from Texico to Dalles, N. M., where it connected with the existing main line to California. The line was ready by 1908. The business carried by this line today shows that this improvement was justified. The gap between Washburn and Amarillo was filled by building a direct line from Panhandle to Amarillo. Terminals were acquired and shaped up in Amarillo for taking care of an increase in traffic. But no one could foresee how great the actual increase in traffic would be in twenty years.

In 1906, a branch line was built from Canyon to Plainview. This line was extended to Lubbock in 1909. The same year work was started on a 200-mile extension from Lubbock to Coleman, where it connected with the line to Galveston by way of Temple. This line was completed in 1911 and gave the plains another outlet to Gulf ports. A branch line of 27 miles from Plainview to Floydada and another branch of 54 miles from Slaton to Lamesa were constructed in 1910. The gap between Lubbock and Texico, 88 miles, was filled in 1913, providing a new trunk line from the Gulf of Mexico to the Pacific coast. In 1915, a 40-mile branch line from Lubbock to Crosbyton was bought. In 1918 a line, 64 miles long, from Lubbock to Seagraves was completed. The construction of an 84-mile line from Shattuck, Okla., across the north plains to Spearman, Texas, was completed in 1920, work having been delayed somewhat by the war. In 1925, a line, 63 miles long, was built from Doud, west of Lubbock, through Hockley and Cochran counties to Bledsoe, near the New Mexico state line.

More than 500 miles of feeder branches have been built since 1907 to develop the Panhandle country of the Santa Fe, and from a territory that produced only one commodity, live stock, it has become an important cotton and wheat raising and shipping territory. The oil development has given considerable impetus to its prosperity. The extent to which this business has grown is indicated by the fact that, in January alone, gasoline plants in the district manufactured more than 5,500,000 gal. of gasoline, while the storage of gasoline amounted to 1,225,000 gal. In Amarillo proper, the assessed valuation of property increased \$16,000,000 or 33 per cent in 1926, and, of course, the railway property holdings there increased commensurately in value.

# Bouquets for the Southern Pacific

ARRY W. FORMAN, assistant to the general manager of the Western Pacific, whose business it is to give lectures on efficiency, courtesy and other subjects to the trainmen of that road throughout its extensive lines, in his latest circular (No. 105, March 14), gets down to "brass tacks" by using, for the illustration of his points some concrete instances, lately observed, of both good and bad conduct; and he preserves the absolute impartiality of his relations with his own men by taking these instances from the everyday life of another road, the Southern Pacific. The circular, addressed to passenger conductors and brakemen, reads, in substance as follows:

Rule 805 reads:

"Employees should cultivate a graciousness of manner, not only in dealing with the public, but also with fellow employees. Always have in mind the importance of answering questions promptly and cheerfully and otherwise exhibiting a spirit of friendly accommodation. Short, curt replies give offense."

I was on a streetcar the other day when a well dressed gentleman entered and started to a seat at the front end of the car, forgetting for the moment to drop his fare in the box. The conductor waited until the man had reached the middle of the well-filled car then exclaimed in an unnecessarily loud and insulting tone, "Say, what are you trying to put over on me? Come back here and pay your fare."

I travel about 20,000 miles a year on Southern Pacific passenger trains and am most favorably impressed with the genuine courtesy and hearty greetings their passenger men always extend to all passengers, regardless of their condition in life. I will recite for your thoughtful consideration a few recent cases coming under my personal observation:

I placed a rather heavy package on the rack above my seat. When I reached my destination the brakeman asked me to please let him take down the package and carry it from the train.

A man was smoking in a car which was not set apart for that purpose. The brakeman caught the man's eve, touched his lips with his finger and shook his head. The smoker thanked him by a nod, got up and walked into the car ahead. I do not think anyone else noted the incident

A lady boarded the train at my station. She was carrying an ordinary handbag which did not appear to be heavy. Nevertheless the brakeman said, "Lady, please let me handle that grip." She explained it was not heavy. He replied, "No matter, that is one of the things for which I am paid," then relieved her of it, assisted her on the train, found a seat for her and placed the bag on the rack.

On the first of the month a great many commuters find it necessary to pay fare because of having neglected to buy books of tickets the day before. Often they hand the conductor a ten dollar bill from which he must deduct about a thirty-eight cent fare, or some such sum and return the proper change with a receipt for the money. Although these trains consist of from three to eight coaches of passengers and conductors are severely taxed to collect all fares before reaching the city, they never exhibit impatience.

When passengers board these trains at different points, the brakemen have a smile for all, and when the conductor collects transportation he always greets everyone with a hearty "good morning," or some cheerful

Should a train be delayed, passengers are told what caused the stop and about how soon the train will be

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on its way again. This is in marked contrast to an experience I had on another road a year ago. Our train stopped for some time. Eventually a trainman passed through the car and a lady asked him what was causing the delay. He replied, "We just killed a guy." A blunt statement of that kind causes unnecessary distress, especially among women passengers.

A young woman who evidently was inexperienced in traveling, inquired of a Southern Pacific brakeman as to the time her train was due at a station about a hundred miles away. He found it necessary to consult his timetable. While he was doing so, she exclaimed, "For God's sake don't you boneheads know anything?" He replied courteously, "I wanted to be sure, lady, so as not to give you wrong information." I know it is hard to be a gentleman at times; but it pays.

Now that heavy passenger travel is in prospect, let us unite to establish for the Western Pacific a reputation for courtesy and cheerfulness. Many trips, which otherwise might have been pleasant, have been spoiled by passengers encountering some disagreeable experience in their dealings with train employees, possibly due to thoughtlessness on the part of trainmen, but nevertheless to which such great importance is attached by them that they not only will not travel that way again, but have been known to go out of their way to advise others not to do so.

# Freight Car Loading

REVENUE freight car loading passed the million mark in the week ended March 12 for the first time this year with a total of 1,005,715 cars. In 1926 the first million-car week was in May and in 1925 the first was not until July. This represents an increase as compared with the corresponding period of last year of 38,292 cars and an increase as compared with 1925 of 79,596 cars. Heavy coal loading, which amounted to 220,179 cars, or an increase of 31,345 cars as compared with last year, was largely responsible for the high total attained, but there was also an increase of 9,161 cars in miscellaneous loading and of 4,457 cars in loading of l.c.l., freight, while grain and grain products, livestock, coke and forest products showed reductions. Ore load-

ing showed an increase of 416 cars. All districts except the Southern showed increases as compared with both 1926 and 1925, and the Southern showed only a very slight decrease as compared with last year. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue	Freight	Car	Load	ing-Week	Ending	Saturday,
	×	M	larch	12, 1927		
Districts				1927	1926	1925
Eastern				241,459	236,440	219,597

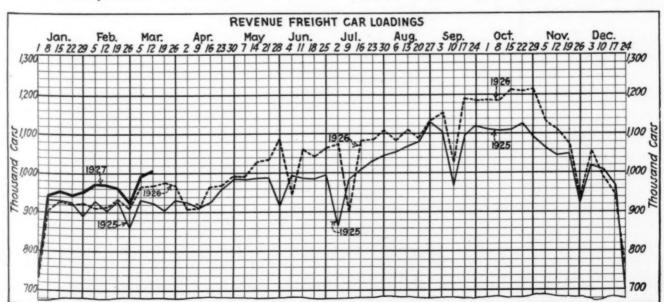
Districts	1927	1926	1925
Eastern	241,459	236,440	219,597
Allegheny	208,925	198,556	193,131
Pocahontas	60,915	51.597	42,870
Southern	161,665	161.692	156,763
Northwestern	116,850	114,799	112,821
Central western	138,932	132,183	135,371
Southwestern	76,969	72,158	65,566
Total western districts	332,751	319,140	313,758
Total all roads	1.005,715	967,425	926,119
Commodities	-,,	,	,
Grain and grain products	40,076	40,245	37,157
Live stock	27,298	27,302	27,554
	220,179	188,834	150,552
Coal	12,080	14,163	12,709
Coke Forest products	70,497	75,330	81,861
	10.840	10,424	12,031
Ore Mdse. L.C.L.	268,788	264,331	259.825
Miscellaneous	355,957	346,796	344,430
	1.005,715	967,425	926,119
March 5	994,931	965,009	932,044
	923.849	912,935	864.096
February 26	960,873		
February 19		932,281	925,886
February 12	968,317	917,625	903,935
Cumulative total, 11 weeks	10,349,326	10,038,022	9,938,159

The freight car surplus for the week ended March 8 averaged 267,616 cars, a decrease of 7,537 cars as compared with the preceding week. This included 136,651 box cars and 82,203 coal cars.

# Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended March 12 totalled 65,103 cars, an increase of 2,039 cars over the previous week and an increase of 11,403 cars over the same week last year.

	Tota	Total for Canada			Totals
Compatible.	Mar. 12, 1927	Mar. 5, 1927	Mar. 13, 1926	1927	1926
Commodities					
Grain and Grain Products	9,229	8,114	6,268	85,387	73,302
Live Stock	2,060	2,089	2,114	20,460	20,174
Coal		6,246	4,177	66,441	50,524
Coke	327	377	382	3,964	5,195
Lumber	3,440	3,416	3,308	29.873	30,876
Pulpwood	6,555	6,507	3,324	57,559	39,435
Pulp and Paper		2,179	2,619	22,217	26,892
Other Forest Products	3,542	3,849	3,518	34,377	35,975
Ore		1,506	1,386	13,846	14,376
Merchandise, l.c.l		16,898	15,301	157,612	145,202
Miscellaneous		11,883	11,403	111,911	106,934
	65,103	63,064	53,700	603,647	548,885
Total Cars Received from Connections	44.338	41.341	40,536	381.803	360,690



# Gulf, Mobile & Northern

Former logging road reports large increases in tonnage and earnings due to improved connections and efficiency

HE Gulf, Mobile & Northern, a road formerly of minor importance, has recently been attracting no small amount of attention because of an interesting policy of expansion, greatly increased traffic, improved operating efficiency and the resulting substantial increase in gross and net earnings.

Ten years ago the Gulf, Mobile & Northern was hardly more than a logging road and in keeping with many

roads of that character its standards of efficiency were not high. The amount of return tonnage was deplorably low and the traffic other than forest products was small,

The present company dates back to a re-organization in 1917, at which time operated 402 miles of line extending from Mobile, Ala., to Middleton, Tenn., with branches. certain road the Today operates 693 miles of line, inclusive of trackage rights, and will shortly complete extensions which will increase the mileage to 733. The main line now extends from Mobile to Paducah, Ky. Between Jackson, Tenn., and Paducah, Ky., the Gulf, Mobile & Northern has trackage rights for 145 miles over the Nashville, Chatta-

nooga & St. Louis, and at Paducah connection is made with the Burlington which by means of a traffic agreement is given an outlet via the Gulf, Mobile & Northern to the port of Mobile.

The branches include a line from McLain, Miss., to Piave, 24 miles; one from Union, Miss., to Meridian, 33 miles; the line of the Birmingham & North Western from Jackson, Miss., to Dyersburg, 49 miles, and also the Jackson & Eastern which at present extends from Union, Miss., to Lena, 33 miles, but which is being extended to Jackson, Miss., 40 miles additional. At Jackson, Miss., a connection will be made with the New Orleans Great Northern and a traffic agreement has been made with the latter which will provide an entrance into New Orleans. At Mobile the Gulf, Mobile & Northern

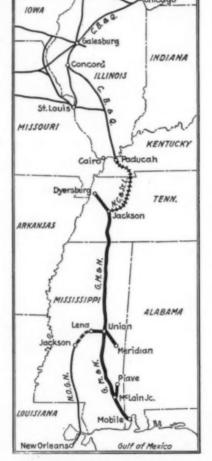
has valuable terminals including 140 acres fronting on the government canal.

# 1926 Earnings

The annual report of the Gulf, Mobile & Northern recently issued showed net income after interest and other fixed charges totaling \$1,319,428. This was equivalent after allowance for the full 6 per cent preferred dividends to \$5.77 a share on the common stock. In 1925 the company reported net earnings of \$1,298,-050, equivalent after allowance for preferred dividends to \$5.58 per share on the common. Comparison with previous years is given in Table II from which it will be observed that as compared with 1917, the first year of the re-organized company, the total operating revenues in 1926 had increased more than  $2\frac{1}{2}$  times, the net operating revenues nearly three times and the net after charges had doubled. The road is now handling about three times the volume of freight traffic that it used to move before federal control. significant index of the improvement in the road's position is the comparison of net railway operating income. The road had a standard return from operations during federal control, or average annual net operating income for the three years ended June 30, 1917, of \$558.338. The 1926 net railway operating income of \$1,412,885 was 21/2 times this pre-war or pre-reorganization standard of earning power.

### Financial

The Gulf, Mobile & Northern has benefited particularly from this improvement in earning power because of its unusually simple capital structure. It had outstanding on December 31, 1926, only \$4,000,000 of bonds



The Gulf, Mobile & Northern

Table I-Condensed In	come Sta	tement	
	1926	1925	Increase of
Average miles operated  Operating revenues:	526.74	466.05	60.69
Freight Passenger	\$5,729,757 375,325	\$5,667,036 400,869	
Total, including other  Operating expenses:	\$6,369,586	\$6,321,033	\$48,552
Maintenance of way and structures Maintenance of equipment Traffic Transportation	1,006,296 971,574 305,029 1,772,562	927,246 963,358 286,766 1,861,110	8,216 18,263
Total, including other	\$4,340,930	\$4,338,042	\$2,888
Net revenue from railway operations. Railway tax accruals. Railway operating income Equipment rents—Dr. Joint facility rents. Net railway operating income. Non-operating income Gross income Deductions from gross income. Net income Operating ratio	\$2,028,656 517,044 1,509,728 64,371 Dr. 32,472 1,412,885 169,729 1,582,613 263,186 1,319,428 68,15	\$1,982,991 486,312 1,493,948 121,681 Cr. 17,703 1,389,970 148,067 1,538,037 239,987 1,298,050 68,63	15,780 57,310 —50,175 22,915 21,662 44,577 23,199 21,378

but has recently issued an additional \$3,000,000 on account of its improvement program. Its preferred stock totals \$11,415,600. This stock pays 6 per cent cumulative from January 1, 1920. An initial quarterly dividend of 1 per cent was paid in November, 1923, and the regular rate of 6 per cent has been paid since February, 1925. Preferred dividends in arrears now total 17½ per cent. No dividends have ever been paid on the \$10,500.

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996,100 common stock. The preferred stock is now selling on the stock exchange at about 110. The common stock has had a range this year between 35½ and 68. The price of this stock ranged during 1926 between 25½ and 41½. In 1925, however, before there was adequate appreciation of the road's improved position, the price range was between 3 and 36¾.

# Plans of the New Management

The new owners perceived, in taking the road over upon its re-organization in December, 1916, that under the circumstances existing at that time, the life of the railroad would be limited to the life of the lumber supply in that territory. It appeared necessary, therefore, either to develop new industries or to make such connections as would give the road an improved stragetic position as an intermediate carrier. The management decided on both and also recognized the necessity of equipping

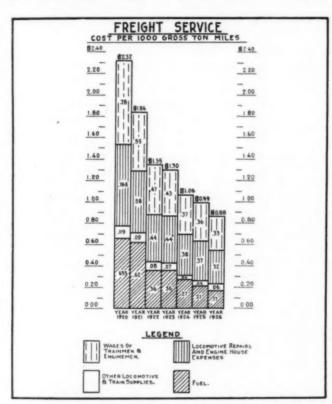


Fig. I-Chart Showing Decrease in Transportation Costs

and maintaing the property at a standard which would insure the shippers speed and safety.

Upon the return of the roads to private control the Gulf, Mobile & Northern had perfected its program of improvement and proceeded to put it into effect. Meanwhile, a branch line had been built from McLain, Miss., to Piave, which tapped a heretofore untouched lumber

section. The purchase of the stock of the Meridian & Memphis was effected in January, 1918, by which the Gulf, Mobile & Northern secured another outlet. All the funded debt and an option on a majority of the stock of the Birmingham & North Western was acquired in 1924 and 1925.

The major project, however, undertaken during those years was the building of the extension, completed in

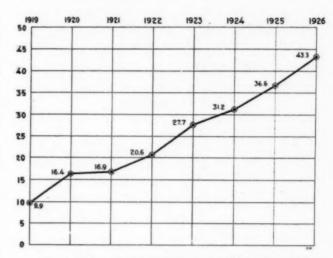


Fig. II-The Improvement in Car-Miles Per Day

1919, from Middleton, Tenn., the road's former northern terminus, to Jackson, Tenn., 40 miles, where a number of valuable freight connections were made. The road's financial security, if not prosperity, may be dated from this move.

Figures compiled by J. E. Roberts, superintendent of transportation of the Delaware & Hudson, and chairman of the Car Service Rules Committee of the Transportation Division, American Railway Association, and presented at the sixteenth annual meeting of the Southeast Shippers Advisory Board at New Orleans, December 10, 1926, showing the ten Class I railroads of 400 miles or over, making the greatest improvements in car performance factors in 1925 over 1922, placed the Gulf, Mobile & Northern at the top of the list. The factors entering into his compilation, and the performance made by the Gulf, Mobile & Northern, follow:

	1925	1922	Imp ovement
Miles per car per day		20.6	16.0
Net ton-miles per car per day	674	387	287
Net tons per train	578	438	140
Per cent cars in shops	5.3	27.5	22.2
Per cent loaded to total car mileage	79.0	77.7	1.3

Some of the records made by this railroad during the year 1926 are compared with those of previous years in the following summary:

# Average Miles per Car per Day

The average miles per car per day (all cars) for 1926 was 43.3, as compared with 9.9 during 1919. Figure I shows the

Table II-Gulf, Mobile & Northern, Operating Results, Selected Items, 1916 to 1926

Year		Average mileage operated	Revenue ton miles	Revenue passenger miles	Rev. per ton mile cents	Total operating revenues	Total operating expenses	Net operating revenue	Operating ratio	Net railway operating income	Net after charges	Net charges for ad- ditions and betterments
1916		402	134,334,279	11,704,950	1.22	\$2,051,088	\$1,486,395	\$564,693	72.47		-\$124,974	
1917		402	137,285,504	12,543,940	1.357	2,322,650	1,589,401	733,249	68.43		772,011	\$845,477
1918		424	125,774,952	15,058,994	1.484	2,418,292	2,168,070	250,222	89.10	\$200,289	122,861	1,201,844
1919		438	111,074,724	19,308,501	1.902	2,823,506	2,847,579	24,072	100.85	-98,977	-189.156	856,682
1926		470	216,241,510	23,380,047	1.471	4,147,960	4,909,102	-761,141	118.34	-1,034,097	-815,224	543,871
1921		454	219,546,943	13,976,145	1.552	4,086,217	3,653,018	433,199	89.39	98,370	44,588	536,242
1922	*******	437	272,380,212	11,812,685	1.443	4,541,439	3,320,393	1,221,045	73.11	791,223	744,340	771,596
1923	*******	466	391,446,479	14,799,752	1.327	5,944,549	4,459,952	1,484,597	75.03	955,307	940,497	834,699
1924		466	425,595,743	13,399,288	1.267	6,088,030	4,366,287	1,721,743	71.72	1,211,976	1,122,223	592,276
1925	******	. 466	418,848,758	11,718.085	1.353	6,321,033	4,338,042	1,982,991	68.63	1,389,970	1,298,050	644,623
1926	*******	. 527	441,322,377	11,348,085	1.298	6,369,584	4,340,927	2,028,657	68.15	1,412,885	1,319,428	562,820

Standard return for operations during federal control or average annual net railway operating income for three years ended June 30, 1917 was \$558,338.

performances made during the years 1919 to 1926, inclusive The best record for any one month was made in February, 1927, with 49.6.

This has, of course, resulted in a material reduction in per diem which has also been further reduced due to a larger percentage of available cars being delivered to connections before midnight. During the year 1926, 99.8 per cent of all available cars were delivered before midnight, compared with 98.6 per cent in 1925 and 95.5 per cent in 1924.

# Average Gross Tons per Freight Train

The average gross tons per freight train during 1926 were 1,272, compared with 1,209 in 1925, and 1,131 in 1924. The peak was handled in October, 1926, with 1,374 tons. The south-bound peak was handled during the same month with 1,312 tons.

The north-bound peak handled in May, 1926, was 1,306 tons.
The gross ton-miles per train-hour (excluding locomotive and tender) during 1920 totaled 6,656, but in 1925 the total was 14,072 and in 1926 it was 15,589, an increase over 1920 of 134 per cent.

# Fuel Performance

A consistent reduction has been made in fuel consumption due A consistent reduction has been made in fuel consumption due principally to increased train loads, improved locomotive equipment, and co-operation of employees. The number of pounds of coal consumed per 1,000 gross ton-miles during 1921 was 181 pounds; 1922, 168 pounds; 1923, 168 pounds; 1924, 144 pounds; 1925, 130 pounds; 1926, 121 pounds.

During the year 1926 there were 104 engine failures, compared with 156 in 1925 and 347 in 1924. The definition of an excise failure on this road is one which causes a delay of five

pared with 156 in 1925 and 347 in 1924. The definition of an engine failure on this road is one which causes a delay of five minutes or more to a passenger train, or twenty minutes or more to a freight train.

During the year 1923 there were 64 reportable train accidents, compared with 49 in 1924; 26 in 1925; and 17 in 1926. Reportable personal injuries during these years were, 176 in 1923; 117 in 1924; 108 in 1925; and 75 in 1926.

With such performance the trend in transportation costs on the Gulf, Mobile & Northern for the four items of wages of trainmen and enginemen, locomotive repairs and engine house expense, fuel and other locomotive and train supplies, saw a steady decline from 1920 as will be observed from Fig. 2.

As further evidence of the decrease in operating costs the following table shows the ratio of expenses to earnings during the years 1920 to 1926, inclusive:

	1920	1921	1922	1923	1924	1925	1926
Mainten'ce of way and structures Maintenance of equipment	34.73 26.37	17.20 19.33	14.27 16.70	15.26 17.18	15.58 16.66	14.67 15.24	15.80 15.25
Traffic	3.23	3.84	3.72	3.58	4.34	4.54	4.79
Total (Operating ratio) 1	18.34	89.40	73.11	75.03	71.72	68.63	68.15

# Roadway

The roadway is being constantly improved. During the ten years 1917 to 1926 the Gulf, Mobile & Northern has spent for additions and betterments a total of \$7,-390,129 as shown in the last column of Table II. The physical characteristics of the road today are as follows:

- Ruling grade 1 per cent compensated. The main line is practically all ballasted with gravel
- and slag.
  The main line contains approximately 70 per cent treated ties.
- 4. The alinement of the main line is 79 per cent tangent and 21 per cent curve.
  5. The main line has 7.36 miles of ballast deck trestles, average length 157.93 ft., and 3.54 miles of open deck trestles, average length 76.97 ft. Lineal feet of trestle
- per mile on main line is 140.84. 6. The main line rail is as follows: 60 pounds 70 pounds

# Total mileage of owned main track..... Tractive Effort of Locomotives

On January 1, 1921, the Gulf, Mobile & Northern had a total of 57 locomotives with a total tractive force of 1,511,000 lb., or an average of 26,509 lb. At the present time it owns 69 locomotives, with a total tractive effort of all locomotives of 2,550,000 lb. or an average per locomotive of 37,029 lb.

### Character of Traffic

The following is a comparision of the road's traffic in 1926 with that of 1927:

### Classification of Freight Tonnage

	1926		1917		
	Tons	% of Total	Tons %	of Total	
Products of agriculture	306,013 9,718	12.00	137,001 7,504	10.18	
Products of mines	299,210 1,336,652	11.73 52.40	85,781 939,509	6,37	
Manufactures and misc	529,073 70,050	20.74	116,416 59,942	8.65 4.45	
Total	2,550,716		1,346,153	100.00	

Forest products have declined from 70 per cent of the entire tonnage in 1917 to 52 per cent in 1926. actual tonnage in this classification has increased 42 per cent but other tonnage has been increased three times. The average haul which was 102 miles in 1917 has since been progressively increased until in 1926 it was 173 The revenue per ton-mile in 1926 was 1.35 cents; in 1917 it was 1.36 cents.

# Future Possibilities

On August 1, 1926, the Gulf, Mobile & Northern through the acquisition of trackage rights over the Nashville, Chattanooga & St. Louis from Jackson, Tenn., to Paducah, Ky., ran its first train to the Ohio At this point a physical connection is formed with the Chicago, Burlington & Quincy. A reciprocal traffic relationship is in effect with the Burlington by which the Gulf, Mobile & Northern will haul the Burlington's gulf-bound tonnage. Certain other connections, namely: the Frisco at New Albany; the Southern at Middleton; the Louisville & Nashville at Bells (via the Birmingham & North Western); the Illinois Central at Jackson, Tenn., and several east-and-west trunk lines, have added materially to the Gulf, Mobile & Northern tonnage, and have provided a wider distribution for tonnage originating on its line. These connections give the Gulf, Mobile & Northern a more favorable position in the transportation system of the section and are, of course, partly responsible for its increase in traffic density and its remarkable progress.

In August, 1926, also, the Interstate Commerce Commission approved the purchase of the capital stock of the Jackson & Eastern, a 33-mile road extending from Union, Miss., to Lena. The Gulf, Mobile & Northern announced its intention of rehabilitating and extending this line into Jackson, Miss., where a reciprocal traffic arrangement with the New Orleans-Great Northern will be effected. Work began at once, and by July, 1, these two roads expect to make the physical connection. This will give the Gulf, Mobile & Northern the significance of an important link in a Lakes-to-Gulf trunkline, serving the two ports, Mobile and New Orleans. It means also the opening up of a rich timber section between Lena and Jackson.

With its connections with the Burlington, the largest grain carrier in the country, the Gulf, Mobile & Northern expects to handle through the two ports, Mobile and New Orleans, a huge volume of this and other commodities from the middle Northwest.

By this expansion on to the north and south, the Mobile road secures the following benefits: Immediate increase in tonnage and revenues through the longer haul and diversion of Burlington's southbound freight exclusively to the Gulf, Mobile & Northern. Additional outlets are afforded for originating freight and additional gateways will provide greater receipts at connec-Commodity distribution will be much more diversified and as a result, traffic will become more stable. Two important cities will be added to the line-Jackson, Miss., and New Orleans, La.

# Pacific Railway Club Annual Dinner

President Storey of the Santa Fe discusses railroad problems of today

HE tenth anniversary of the founding of the Pacific Railway Club was observed in connection with the third annual banquet, held in the Venetian Room of the Fairmont Hotel, San Francisco, on March 10; there were present 435 members and guests. J. A. Christie, terminal superintendent of the Atchison, Topeka & Santa Fe, the retiring president, acted as toastmaster, and W. B. Storey, president of the Santa Fe, was the guest of honor and principal speaker. Vocal numbers were given by Richard Hunter of the Northwestern Pacific's marine fleet and known as the "Caruso of the Ferries."

Announcement was made of the results of the annual election. The new officers are: President, D. A. Porter, division engineer, Southern Pacific Company; first vice-president, H. P. Bell, Key System Transit Company; second vice-president, J. B. Baker, agent, Atchison, Topeka & Santa Fe; treasurer, R. G. Harmon, chief clerk, traffic department, Western Pacific-Denver & Rio Grande. William S. Wollner, of the Northwestern Pacific, who has been the club's secretary since its organization, will continue in that capacity.

Mr. Storey spoke in part as follows:

# Mr. Storey's Address

And now as to the future: What does it contain for us? We are doing well so far as service to the public is concerned, but not so well from a financial standpoint. The ideal position in this respect would be that when we need money for enlargements and to keep up with the growth of the country that we could obtain it by the sale of stock. To do this, however, the stock must be attractive to investors; or to put it another way, we should be able to earn enough to pay liberal dividends. Congress recognized this condition in the Transportation Act when it declared a six per cent return on the value of the property a fair return. The railroads as a whole have not been earning this, although we have approached it closer and closer each year since the roads came back.

From the showing thus far made it is but natural to suppose that we will finally reach the goal sought, but I take a less hopeful view of the situation and am afraid we are not yet on "easy street." We are confronted with increases in wages, with decreased rates, with interference by legislatures and by Congress, and by high taxes. On top of these disturbing influences there is coming a slackening of the intense industrial activity that has existed for the past few years. For these reasons I do not look for any great betterment in our conditions in the near future and I feel that we will have to struggle to hold the gains we have made. The influences which I have named were those which brought us to the brink of bankruptcy before the war and if unchecked will head us again toward government ownership. A recognition, therefore, of the dangers, even though the results may be somewhat remote, are important to all railroad men.

# Wage Increases

Relative to increases in wages: We are, in a measure, in the hands of the government. The Transportation Act of 1920 provided a Labor Board and while the decisions of this board were not always what we con-

sidered fair we felt that a tribunal of some sort was better than the old method of threatened strikes and the uncertainties connected therewith. Unfortunately, a few of the railroads and most of the organizations refused to follow the decisions and orders of the Labor Board. As a consequence a change was advocated which resulted in the present Watson-Parker law. This also leaves disputes to a tribunal in the shape of an arbitration board.

In the first serious question which has come up for settlement, namely, the demand of the conductors and trainmen on the eastern lines for an increase, the decision was adverse to the railroads. We are yet unable to see, in view of the fact that the cost of living has not gone up, why this increase was granted. More recently the southwest has adopted the same increase through the intercession of the mediation board, and there seems no question about the movement spreading over the entire country. It is my feeling, however, that in cases of this kind we must be protected by the decision of some board in order that the public may understand how powerless we are in the matter. This movement for increase in wages is going to be a very serious handicap to all of us in the future, but it is one of the problems that we have to meet and which are going to prevent our having too easy a time of it.

The next matter is legislation. This, of course, is always a danger, but we have been let alone for a good long season. However, there are bills before Congress and before our legislatures that give us much concern. For instance, bills to do away with the Pullman surcharge and to reduce rates on agricultural products. The Interstate Commerce Commission has passed on these matters from time to time, but there is very grave danger that under political pressure matters of this kind may be taken out of the hands of the Interstate Commerce Commission and decided on the floor of the House.

### Legislation

The passage of laws by legislatures materially affect the cost of operation; as example, full crew laws and length of train laws. These are passed ordinarily at the instance of the labor organizations to make more jobs, although they are based on the plea of greater safety. The way in which we have met increased wages in the past and increased expenses of all kinds is by increased carloading, increased train-loading, and increased movement of equipment, and it is principally by such means as this that we can hope to survive any future increases in wage rates, yet the labor organizations in many of our states are a potent factor in pushing bills of this character. It is to be regretted that our men do not recognize that what helps us financially also helps them, and that bankrupt roads do not help the country and therefore do not help the railroad man. The period of prosperity through which we have been passing has enabled the Santa Fe to employ more men of all descriptions than could possibly be accomplished even if every state had full crew laws and train limiting laws.

The increase in taxes has been more startling than practically any other increase since 1914. Attention is called in many directions to this particular increase, but it seems to me that nothing is done in the direction of

curing the evil. As a matter of fact, high taxes cannot be cured without stopping the cause of high taxes, namely, the spending of money for city, county, state, and national purposes.

I know the word "economy" is somewhat in disrepute at the present time, but as a matter of fact it must be given consideration or it is going to seriously affect the business life and hence the general prosperity of the country.

# The Question of Consolidations

There is one other railroad problem that is brought about by the Transportation Act, namely, that of consoli-The sentiment of the country at the time the act was enacted was in favor of combining all the railroads of the country into a few systems, with the idea that thereby economies could be effected that would ultimately result in saving to the public by enabling lower rates to be made. As a matter of fact the consolidations will not accomplish what was hoped for them. It is true there might be some saving in the matter of general officers, but there is not now, taking the country as a whole, a surplus of supervisory forces so far as the great mass of employees are concerned. Just as many men will be needed in the future as with our present We will need as many trainmen, as many agents, as many auditing department people as at present; also as many superintendents and as many general managers. We might do away with a president or two.

As a matter of fact, the total pay roll of the supervisory forces of the railroads, including general officers, only amounts to about 2 per cent and this includes stenographers and clerks. If you wiped out all of this it would not enable very much reduction in freight rates. It is my opinion that there are some consolidations that would effect economies and that would be a good thing for the country, but I deplore the movement when it is furthered only for the purpose of putting higher prices on the securities of the railroads involved. Some of the consolidations which have been proposed will not help the earning power of the railroads and yet the public seems to have an idea that the value of the stocks representing these roads will be very largely increased. In other words, the question becomes one of stock manipulation rather than actual economies in the interest of the public.

### Public Relations

The last, and what I consider the most important question of all, is that of public relations. Our achievements since the roads came back to us have furthered the good opinion that the public has of us. It is extremely important that this good opinion be continued and you, the employees of these railroads, are the ones who must assist in the furtherance of this feeling. You are the intermediaries between the corporations and the public. The public gains its impressions from you and from your attitude toward it.

There should be no hesitancy in letting the public know what the railroads are trying to accomplish. The advisory boards which have been formed throughout the country have been very potent in keeping the public in touch with the railroad problems. It is up to you to take an interest in these advisory boards. I know you are all busy people, but there are certain duties which you owe the public and this is one of them. You have done so well in the past seven years that I feel satisfied as to what you can accomplish in the future. The only warning which I want to give you is that we must not grow careless and must not feel that the battle is now won and that we have nothing else to do.

# D. & R. G. W. Receives Revenue from "Hoboes"

VER \$18,393 was secured by the Denver & Rio Grande Western from 5,233 head-end passenger train and freight train riders out of a total of 28,488 apprehended during 1926. In September, 1924, this company adopted the plan of rounding up hoboes and, if money was found in their possession, instructing them to buy a ticket from the point at which they boarded the train.

During 1925 a total of 36,061 hoboes were taken from various hiding places on the company's trains and of this number 3.636 paid fares under protest, the amount totalling \$11,227. In 1926 the number rounded up de-



Hoboes Buy Tickets

creased to 28,488, while the number who paid their fares increased to 5,233 and the amount of revenue increased to \$18,393. To carry on this plan special agents in principal junction points are used in rounding up the hoboes. These points include Pueblo, Colo., Salida, Tennessee Pass, Glenwood Springs, Grand Junction, Soldier Summit and Thistle. When the hobo is taken from the train the agent determines whether he has money in his possession and if so marches him to the ticket office where he is instructed to buy a ticket from the point at which he took the train. The ticket for the service performed is can-

celled and turned in to the auditor of passenger receipts. In many cases hoboes who are proceeding to points beyond the place where they are apprehended purchase tickets to such destinations and the tickets are given to the purchaser. Special agents have sold tickets as far as New York to persons intercepted in this way. Occasionally these tickets purchased to some new destination are sent in for redemption, the holder having stolen a ride. The special agents make a record of all purchases of this kind and send them to the passenger department so that the latter can check local tickets sent in for redemption. When the record shows that the ticket was sold to a hobo the obligation to redeem is questioned and the refund declined.

The study which the Denver & Rio Grande Western has made of the hobo indicates that he is influenced by the advertising of scenic attractions, etc., in the same manner as passengers who pay their fares. It has been found that the months of April, May, June, July, August, September and October, are favorite months for the hoboes to visit the Rocky Mountain region which is served by the Denver & Rio Grande Western.

# Power-Operated Gates on I. C.

By G. I. Wright
Asst. Electrical Engineer, Chicago Terminal Improvements, I. C.

ARKED economies in grade crossing protection have been secured by the Illinois Central through the installation of power-operated gates at 39 crossings in the South Chicago and Blue Island districts of its Chicago terminal where suburban trains operate in large part through city streets. Power operation has made possible the control of gates at several crossings by one watchman. Under the present method of operation 57 crossing gate watchmen are needed for 24 hours a day whereas 111 watchmen would be required if the same amount of protection were to be secured under the old method of hand operation with a watchman at each crossing.

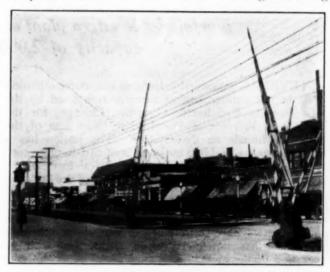
As a part of its electrification program in Chicago, this road, about four years ago, rearranged its tracks running through the streets in this section of the city. After electrification more trains were added, which, due to their quiet, high-speed operation and the greatly increased automobile traffic, made street crossing protection a difficult problem. Diaphragm pneumatic gates operated by hand pumps located in watchmen's cabins on the ground were in service at several of the street crossings and at the time the track arrangements were made it was decided to protect all street crossings and to have one gateman control not only the crossing at which he was located but also the crossing a block away in each direction. This section of the city has grown very rapidly and the streets on which the Illinois Central operates have been paved on each side of the tracks.

operates have been paved on each side of the tracks.

To obtain a good view of the distant crossings the men have been placed in elevated towers located between the tracks and a motor-operated air blower has been installed in each tower for the operation of both the old and new gates. This scheme of operation was developed by the railroad, using apparatus manufactured by the Buda Company of Harvey, Ill. It has proved very successful, due to the low cost of operation and maintenance and the ease and reliability of operation. In addition, the first cost of gates of this type is less than that of electrically-operated gate.

The air blower set, which is located in the towerman's cabin, comprises an induction motor driving a small,

low-pressure air blower, which exhausts air at any pressure desired up to 14 lb. The air is fed to the gates through four-way cocks, allowing the operator to admit air to one side of the diaphragms or cylinders and exhaust it from the others. Thus the operator has complete control over the motion of the gates, being



Power Operation Has Made It Possible for One Watchman to Control the Gates at Several Crossings

able to stop them in any position. Three sets of four gates are operated from one tower and one blower, the latter only being operated while the gates are used, or while a train is passing. A simple push-button type of motor controller governs the starting and stopping of the air unit. In this way practically all of the air is utilized for actual work, the energy consumption being only 17 watt-hours for the raising and lowering of four gates. Means are provided for varying the air pressure to take care of different conditions, such as wet and heavy gates, strong winds, different weights of gate arms, etc. first installed the blowers were found to make a puffing noise, which was considered objectionable due to the installations being in a residence neighborhood, but this has since been eliminated by the installation of special intake mufflers. The I. C. has operated 14 of these power blowers at gate-protected crossings for 4 years and 3 have been in operation for 3 years, all of them operating every day in the year. To date the expense of all repairs to the air units has been less than \$25 and the total repairs to the 17 motors, including control equip-These expenses ment, has amounted to less than \$25. are all that have been necessary in addition to a periodic oiling, which item averages 38 cents per generator and

The motor-operated blower may be installed wherever electric current is available, either for a new installation or to replace present hand-operated air gates of any type or manufacture. The gates can be several hundred feet from the tower controlling them and the installation may include any number of gates which the operator can control effectively. No air storage tanks, no reducing valves, and no automatic governor on the motor are required, and no wiring is necessary except that for the starting and stopping of the motor. Condensation and resultant freezing of air lines is eliminated as the air is not compressed enough to condense water vapor. The units may be installed in a regulation watchman's cabin, or in a suitable housing at the base of a gate tower, as a space about 18 in. by 18 in. by 4 ft. is all that the equipment requires.

# Large Coaling Station Embodies New Features

Norfolk & Western plant at Portsmouth, Ohio, has storage capacity of 2,000 tons in two bins

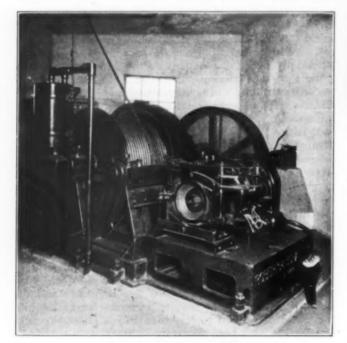
SEVERAL noteworthy features command attention in the coaling station recently completed by the Roberts & Schaefer Company, Chicago, for the Norfolk & Western at Portsmouth, Ohio, one of the busiest terminals on that system. The station has a storage capacity of 2,000 tons and is of cast-in-place concrete throughout. The bin is of cylindrical form with a conical roof, now a standard construction of the builders. However, this installation differs from some of the others of the same type in that there is no penthouse on top of the bin. The skip dumper on the bin, as well as the inclined hoistway, are entirely in the open, experience having shown that snow and sleet do not interfere with the operation of the hoist and that maintenance of the steel work is expedited rather than obstructed by the open

coal hoisting has been made possible by the use of hoists equipped with two-speed Lincoln motors. These motors, which are virtually two motors in one, are designed to



One of the Skip Buckets in the Dumping Position—Note the Hinged Cover for the Hatch

rotate at two speeds, 450 and 900 r.p.m. The control is so arranged that the skip is started out of the pit at the lower speed, but moves for most of its travel at the



One of the Automatic Hoists

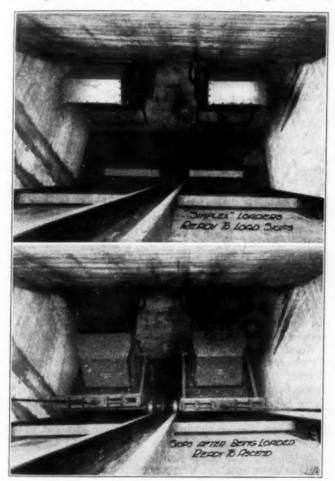
construction. With the dumper in the open, it is necessary to provide some way to close the hatches through which the coal is dumped into the bin, steel plate hatch covers being provided which open automatically as each skip load is dumped and then close immediately.

The plant is equipped with a track hopper serving two coal-receiving tracks, making it possible to receive coal from two cars simultaneously. However, the main advantage of the large hopper is that it is of sufficient capacity to receive the full load of one car, thereby making it possible to release the car at once. This hopper is arranged to discharge coal by means of Simplex loaders into either one or both of two skip buckets operated by independent hoists on duplicate inclined hoistways. Each elevator has a capacity of 75 tons of coal per hour, or a combined capacity of 150 tons per hour. This rate of



The Structure Is of Poured Concrete Throughout

higher speed, changing again to lower speed/just before reaching the discharge point. The entire operation is automatic under push button control with ample safeguards against accidents in the event of slack cable, overwind, power failure, etc., while the co-ordinate operation of the hoist bucket and loader is such as to insure against overflow of the bucket in loading, a second



Two Views Looking Down Into the Pit at the Foot of the Hoictway

loading of the bucket in the event of its being returned to the pit without emptying, or injury to the loader from a falling bucket. One of the illustrations shows two views looking down into the pit. In one of these the loaders are ready to load the bucket skips and in the other the buckets have just been loaded.

The station has a total height of 135 ft., of which 40

ft. represents the height of the cylindrical tank which is 55 ft. in diameter. However, the space under the conical roof is also utilized as a part of the coal storage. The station serves six tracks, spanning four tracks, with one track on either side. The bin is divided into two pockets by a transverse wall for the purpose of providing separate storage for stoker and lump coal, the separation being effected by a grid under the discharge hatches at the top. Provision is made for the delivery of each grade of coal to locomotives on each of the six tracks.

Another feature of the station is that the sanding facilities are entirely of mechanical and gravity operation, no compressed air being used in handling the sand. The track hopper and hoist are used for the receipt and elevation of green sand which is stored in a bin of 75 tons capacity, located within the conical portion of the tank. Just under this wet sand bin is a drying room built into the upper part of the tank cylinder, entrance to which is afforded by means of a door leading from a platform connected with a ladder flanking the hoistway. This drying room is equipped with three Beamer sand dryers from which the sand is delivered by gravity to a dry sand

bin of 20 tons capacity.

The superstructure of the coaling station is supported on a reinforced concrete tower, consisting of heavy columns and three deep girders spanning transversely. The two hoists and control apparatus are housed in a small building adjacent to the track hopper.

# A Roundhouse as an Artistic Achievement

RAILWAY roundhouse is ordinarily constructed along architectural lines which clearly evidence its utilitarian purpose, that of a building for the housing of locomotives. However, the Southern Pacific now has a roundhouse at Santa Barbara, Cal., which has an appearance, as seen from an adjoining city boulevard, suggesting an amphitheatre built in conformity with Spanish architecture. It represents the principal contribution made by the railroad to the plan carried out by the people of Santa Barbara in their efforts to profit by the need for extensive rebuilding following the earthquake of June, 1925, to the end that the city would have a harmonious appearance in conformity with the Spanish type of architecture which is the natural heritage of southern California.

The roundhouse, which was one of the structures to

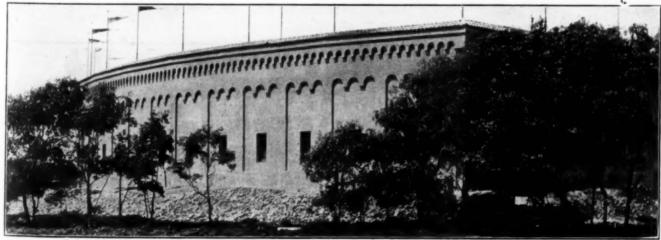
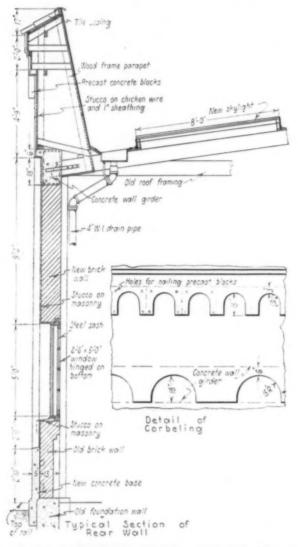


Photo by Collinge, Santa Barbara

This Is Not a Stadium But a Roundhouse

suffer severe damage from the earthquake, was a 10-stall building with wooden frame and brick end and rear walls. It had a typical flat gabled roof sloping to the



How the Rear Wall Was Rebuilt for Special Architectural Treatment

front and rear walls with a monitor on the ridge. The rear wall had wooden sash windows in brick arched openings such as were common until the use of large glass areas and steel sash came in vogue. While plans were under way for repairing the damage done to the house, the Architectural Advisory committee of the city, which was directing the work of restoration along lines that would insure greater harmony and beauty, proposed that the railroad move its engine terminal to another site because it was deemed an eyesore to a projected boulevard which would pass close to the rear of the house. However, when the railway officers pointed to the difficulties in the way of this proposal, the committee suggested the the rebuilding of the house be carried out along lines that would harmonize with the general scheme of architectural treatment as it was then being applied to the reconstruction of buildings throughout the city and the railroad readily complied with this idea, with the result shown in the photograph.

# Appearance of Bullfight Arena

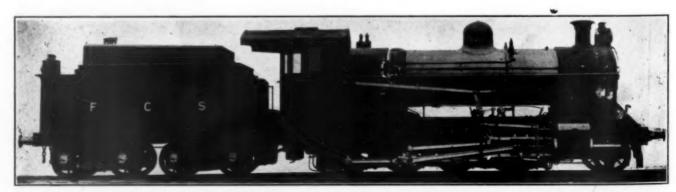
The rear and end walls of the roundhouse, instead of conforming to the usual type of construction, give the appearance of a Spanish bullfight arena with large, unbroken areas surmounted by arched corbeling and an arched cornice. By means of a parapet surmounting the wall, the top is carried high enough to conceal the roof monitor from view and the window areas are limited to a single small window in each bay.

The cross section of the house illustrates how this construction was carried out. The wall is of brick to the bottom of the corbeling which is incorporated in a concrete wall girder that receives the ends of the rafters. The parapet above this girder is of frame construction and is topped with a tile coping. An application of cement stucco to the entire wall, including the brick work, the concrete girder and the frame parapet gives the wall a uniform appearance from top to bottom that is decidedly pleasing.

An extra tier of skylights in the roof adjacent to the rear wall compensates for the loss of natural lighting through rear wall windows.

This manifestation of the co-operative spirit on the part of the railroad in the work of restoring the city of Santa Barbara was further attested in carrying out a change in the color scheme of the passenger station in accordance with the desire of the Architectural Advisory committee.

FRANK KOTRBA, gardener of the Reading Company at Wayne Junction, Philadelphia, is now engaged in preparing plants to be set out in 225 gardens at stations on that company's lines. Mr. Kotrba also has charge of 30 miles of hedges, lining the trac!:s of the Reading.



Three-Cylinder Consolidation for Argentina

Built by Sir W. G. Armstrong, Whitworth & Company, Ltd., Newcastle-on-Tyne, England, for the Buenos Aires Great Southern, Argentina—Diameter of Drivers, 55½ in.; Boiler Pressure, 180 lb.; Cylinders, Diameter and Stroke, 17½ in. by 26 in.; Tractive Porce, 32,900 lb.

# Communications and Books

# Suggestions as to Strike Votes

TO THE EDITOR:

Referring to the article on "The Impending Coal Strike" in your March 12 issue, it seems to be generally recognized that the public is a party in interest in such matters and that the unions try to get some intervention by the government. It seems only fair therefore that the public should have correct information as to the wishes of the miners. Many years of manufacturing experience leads me to believe that in every strike there are very large numbers of the workmen who do not want to strike but fear intimidation if they do not agree. Also there are many who do not understand the questions at issue and vote ignorantly.

It has occurred to me therefore that a strike vote should not be taken except jointly by both parties concerned. Would it not therefore be practicable to have all questions set forth in a manifesto agreed to by both parties, and a copy submitted for study to each member of the unions concerned? Following this at a convenient period a secret ballot should be taken, supervised by representatives of both sides, with the pay rolls as poll books, and the result counted and vouched for by both parties.

Usually when a strike vote is taken, the union officials announce that 95 per cent or more of the men want to strike. In talking with men I have found so many who did not want to strike that I have always doubted these figures and I think this is a very general opinion. This is hurtful to the unions and arouses a feeling of distrust in the official statements. The strike vote should be taken secretly exactly like a regular election, union is not the only one interested and all parties should have equal chance to reach the electorate even to speaking in the union meetings. Otherwise neither party has a right to appeal to the sympathy of the public. I believe such a plan could be put into effect by law.

W. R. WILLIAMS.

# Apprentice Training on the Missouri Pacific

TO THE EDITOR:

A short time ago I chanced to read in the Railway Age of March 5 a letter written by an apprentice on the Baltimore & He described a system of technical training that the Baltimore & Ohio is furnishing its apprentices, and spoke very highly of the interest and results that are being shown. Evidently the Baltimore & Ohio is offering its apprentices the same kind of technical training that the Missouri Pacific apprentices are getting. If so, I am not at all surprised at the interest and the results reported.

Perhaps the best way to describe the effect of this new training on my road will be to tell my own impressions and my experiences with it. My experience began one morning last October, when a fellow apprentice came to me with the news that there was a letter at the office for me. As he turned away, he added, "And, oh boy, there sure is some good news in it.

It proved to be a letter from Mr. Garber, our chief mechanical officer, telling of a course of technical training that was going to be furnished by The Railway Educational Bureau, of Omaha, Nebraska. Within a short time, Mr. Schulthess, from Mr. Garber's office, visited all the shops and division points to explain the plans more fully, and to answer such questions as anyone cared to ask. I think some of the boys were a bit surprised when they learned that every apprentice would be required to keep his studies up to a certain schedule, whether he felt inclined to or not. But no one was at all scared, as Mr. Schulthese said that they did not want to lose a single man through failure to make good on the studies. We were assured that there would be men appointed for the express purpose of helping and directing us when we needed it.

Compulsory study may seem a little bit "hard boiled," but I am here to tell you that the compulsory clause is what will make these technical courses produce results. Do you ask why? Well, I know a lot of fellows who paid real money for courses of study that they knew would do them good; but when the studies began to get a bit hard, they quit trying. Of course, there was no way for the correspondence school to make them study, and so the entire matter stood-a lot of money spent and no real results. And did they experience "that grand and glorious feeling," when they realized that they were still just a little "dumber" then they ought to be? Well I guess not.

Next on the program was a very encouraging talk from Master Mechanic G. K. Stewart. Every man present pledged himself to help make the Northern Kansas division lead the system. To date we are 100 per cent ahead of schedule with our studies.

The first real work each man received was an arithmetic test. Those who thought themselves proficient in common arithmetic were asked to work the test problems and send them in for Those who wished a complete review could ask inspection. for it, omitting the test problems. Yes, I asked for a complete review as I thought it could not hurt me, and might do a lot of good. Some of the boys worked out the test quite easily. Quite a lot found that they really needed the review. Of course they got it.

Practically everyone took an interest right from the start. You would have thought that there wasn't any compulsion. We went right after the first of our technical education, and incidentally, all went out to make a 100 per cent progress record for our division. Makes us feel just like a bunch of kids in school again. Discussing our work and the lessons at odd times; and

everyone trying for a good individual record.

Most of us have passed the elementary arithmetic lessons, also the lessons on reading blueprints and on shop sketching. We are looking ahead to our mechanical drawing, and to the special lessons that will come later to apprentices in the various crafts-machinists, boilermakers, blacksmiths, etc. Something special for each trade. Can you beat it?

One thing that makes this interesting is the fact that so much of the instructions pertain to things we can see in the shop every day. Like as not, a fellow may be studying a blueprint of just the thing he is working on in the shop. Now, every fellow can pick up a blueprint and know the meaning of every projection line, abbreviation and letter. Not like going to college-but a lot better.

Every fellow seems to take an interest in helping the other fellow if he gets stuck. I have never seen the time when there was not someone within reach who could help one over a hard spot. It sure brings that "glorious feeling" again when you are able to help lift the load off another's shoulders, and to see the big smile when the problem becomes clear for him.

Perhaps each fellow has a different way of studying. I find that I get the best results by reading an entire lesson clear through so as to get its general drift, before trying to study and understand each item. Lots of things seem to come easier for me that way. I never look at the examination questions until I feel that I have mastered every part of the lesson; and even then, I sometimes have to go back and study some more.

This matter of home study-"Every fellow by himself"-is a good thing, too. A man knows that when he turns in an examination paper it will be graded impartially. If the work doesn't merit 100 per cent it does not get 100 per cent. Your weak spots are shown up and explained, if necessary. And the fellow who doesn't make 75 per cent or better has to study the lessen some more and send in another examination paper. whole plan works to the benefit of the apprentice, in the long run.

A permanent instructor is assigned to our part of the road. He travels from shop to shop, helping those who need help; giving encouragement where it is needed; and bestowing a bouquet here and there when it has been earned. I, for one, will say that our instructor, Mr. Bason, deserves a grand fine bouquet, too. He sure keeps us interested. Besides giving us

individual help on our work, he sometimes gets all the boys into the master mechanic's office and gives us an instructive talk on some interesting subject. The last one was on "Steel and Iron,"—how it is mined and made—from the time it is dug out of the ground until it leaves the rolling mills in the form of iron bars, boiler steel, tool steel, etc. Sure was interesting. Every chair in the office was filled—some of the boys sat on the floor, and some stood up, but no one wanted to leave. We always look forward to these talks. Each one of them teaches us something worth knowing. And it impresses us with the value of "knowing something."

I am only one of the hundreds of apprentices on the Missouri Pacific who are benefiting by the educational training that the management has so generously included in our apprenticeship; but I know that the hundreds of others agree with me that it is going to be a fine thing for everyone of us—and for the Missouri Pacific, too. We can see the day coming, not far distant, when it will be a special point of pride with us when we say we were Missouri Pacific trained.

R. E. STANLEY.

Machinist Apprentice, Missouri Pacific.

# Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

# Books and Pamphlets

China—A Commercial and Industrial Handbook, by Julean Arnold, American Consular Officers and Other Contributors. Railway map inserted between pages 316 and 317 in section "Railways in China" by J. E. Baker, Adviser to Chinese Ministry of Communications, p. 309-327. The section on Chinese Government finance by A. H. Evans includes "Situation of the railways" on pages 293-299. U. S. Dept. of Commerce. Trade Promotion series No. 38. 818 p. 2 folding maps. Pub. by Govt. Print. Off., Washington, D. C. \$1.75.

1926 Transactions of the National Safety Council. The papers and proceedings of the Steam Railroad Section at the 15th annual Safety Congress are in Volume II, pages 753-844. 3 vols. Pub. by National Safety Council, Chicago, Ill.

The Ports of Baltimore, Md., Washington, D. C., and Alexandria, Va., prepared by Board of Engineers for Rivers and Harbors, War Dept., in co-operation with the U. S. Shipping Board. Detailed table of contents for Railroads, p. IV. Illustrations of railroad facilities at Baltimore listed on p. V. Port series No. 16. 395 p. illus. maps. Pub. by Govt. Print. Off., Washington, D. C. \$1.10.

Railroad Securities. Report presented by J. R. Swan, Chairman, Railroad Securities Committee, Investment Bankers Association of America, to the 15th annual convention. 7 p. Pub. by Educational Department, Investment Bankers Asso. of America, Chicago, Ill.

# Periodical Articles

Cost of Borrowed Capital for Public Utilities, by O. Gressens. Annalist, March 18, 1927, p. 397-398.

The Cost of Railway Capital Under the Transportation Act of 1920, by Herbert B. Dorau. Journal of Land and Public Utility Economics, February, 1927, p. 1-20.

Europe's Railroad Electrification Generates Tourists' Praise, by Kent T. Healey. An illustrated popular article, with some costs, coal-savings, etc., given for the Swiss Federal and other electrified railways. Boston Evening Transcript, March 19, 1927, part 5, p. 2.

The Locomotives of the Chicago, Burlington & Quincy Railroad, by Paul T. Warner. Third and concluding article, the other two being mentioned in the booklists for Oct. 2, 1926 and Jan. 8, 1927. Baldwin Locomotives, April, 1927, p. 9-23.

Twentieth-Century Railroad Building. Special features of the Natron Cut-Off of the Southern Pacific. Scientific American, April, 1927, p. 250-251.

Value—by Judicial Fiat, by Donald Richberg. Comment on Indianapolis Water Case. Harvard Law Review, February, 1927,

The Analysis of Equipment Trust Securities, by W. Barrett Brown. Annalist, February 11, 1927, p. 237-238.

# Looking Backward

# Fifty Years Ago

The Philadelphia & Reading has issued an order which requires that no employee of the road shall hold any position in the government of any of the cities or towns along its line. At Reading, Pa., resignations caused by this order left one branch of the city council without a quorum.—Railroad Gazette, March 23, 1877.

It is asserted that the Brotherhood of Locomotive Engineers has violated its agreements with the men whom it bought off from acting as substitutes for the striking engineers of the Boston & Maine. The agreement was to pay them \$3.50 per day as long as the strike lasted, and \$60 per month until they secured situations.—Railway Age, March 29, 1877.

The British Commission on Railroad Accidents has recommended to the House of Lords that the Board of Trade of England be given the power to force railroad companies to adopt the block and interlocking systems on all lines and portions of lines where the introduction of these improvements is necessary for the safety of traffic.—Railroad Gazette, March 23, 1877.

# Twenty-Five Years Ago

John S. Kennedy, a director of the Northern Pacific, testified on March 18, at a hearing ordered by the United States Circuit Court at St. Paul in the suit brought to prohibit the retirement of the preferred shares of the Northern Pacific, that the object in securing control of that company, by means of the Northern Securities Company, was to prevent attacks upon the Northern Pacific by competing companies. During May, 1901, the Union Pacific gained control of the affairs of the Northern Pacific in order to prevent the latter railroad's acquirement of the Chicago, Burlington & Quincy—a move that would materially weaken the Union Pacific in Kansas, Nebraska, Colorado and Wyoming.—Railway Age, March 28, 1902.

On March 24, Judge Grosscup of the United States Circuit Court at Chicago entered an order temporarily restraining the Chicago & North Western, the Illinois Central, the Lake Shore & Michigan Southern, the Pittsburgh, Ft. Wayne & Chicago and the Pittsburgh, Cincinnati, Chicago & St. Louis from cutting rates or paying rebates on packing house products, fresh meats, grain and the products of grain. On the following day a similar injunction was issued from Kansas City against the Chicago & Alton; the Chicago, Milwaukee & St. Paul; the Chicago Great Western; the Atchison, Topeka & Santa Fe; the Chicago, Burlington & Quincy; the Missouri Pacific; the Chicago, Rock Island & Pacific and the Wabash.—Railway Age, March 28, 1902.

# Ten Years Ago

T. M. Schumacher, vice president of the El Paso & Southwestern, has been elected president, succeeding James Douglas, elected chairman of the board.—Railway Review, March 24, 1917.

A decision was handed down by the United States Supreme Court on Monday which held to be constitutional the Adamson act, requiring railways doing interstate business to increase the pay of all men engaged in moving trains in interstate traffic, by 25 per cent.—Railway Review, March 24, 1917.

The strike of the four brotherhoods of railroad trainmen which was called for seven o'clock Saturday evening was postponed for 48 hours pending conferences between a committee of the National Council of Defense, appointed by President Wilson, the brotherhood leaders and the railroad managers, and late on Sunday night the demands of the brotherhoods were granted and the strike called off. The managers agreed to pay the men on the basis of eight hours instead of ten hours whether or not the Supreme Court upheld the Adamson eight hour law.— Railway Age, March 23, 1917.

# Odds and Ends of Railroading

Ticket Agent—"Your train is at 5, madam."

Bargain Hunter (from force of habit)—"Make it 4.98 and I'll take it."

HIGHBALL.

Railway technical journals of 1877 were not entirely devoid of timely humor. In April of that year the Chicago Railway Review recounted the tale of the ancient history teacher who asked his pupils to identify Leonidas. "Leonidas was a member of the Legislature," they replied in chorus. "And what makes you think he was a member of the Legislature, my children?" "Because, sir, he held a pass with Spartan firmness."

Of more than passing interest to baseball fans is the appointment of Charles Herzog to the position of general athletic passenger agent of the Baltimore & Ohio. Those of us who are not too young should remember "Buck" as he chattered away at the rest of the infield to keep up their flagging morale and his peculiar crouch at bat when a hit meant winning the ball game. And many a ball game "Buck" broke up when he was managing the Cincinnati Reds.

The resurgence of public interest in the romance of railroading continues and grows. Morris Markey, in the New Yorker, has an extended and able article on the subject. He selects the Twentieth Century Limited as his protagonist and proceeds to give statistics which must interest and even astonish the lay reader. The public interest being what it is in this subject, we may expect to see railroad men do what they can to foster it, for such interest cannot be surpassed as a builder of cordial public relations.

George B. Jefferis, retired road foreman of engines of the Southern Pacific, has a hobby of collecting safety verses. The two following are among the gems of his collection:

He heard the toot, but tried to scoot, And beat the choo-choo to it, The poor galoot now twangs the loot, Take heed and don't you do it.

Here's another one in case you didn't like that one:

Stop and let the train go by, It hardly takes a minute, Your car starts out again, intact, And better still—you're in it!

The New York World bravely continues its editorial campaign for naming locomotives instead of merely numbering them. The idea, judging from letters to the editor which it prints, is meeting with considerable public favor. The World, however, seems to assume that the practice which it advocates does not exist on American railroads. To be sure, it is far from widespread but, aside from the numerous cases of locomotives which bear the name of their enginemen, there are some outstanding examples which ought to be fairly satisfactory, as for instance the D. & H.'s "Horatio Allen" and the "John B. Jervis" and the new "President" class on the B. & O. These names, to be sure, do not compare with "Chicago Bill" or "Slippery Sam," the type advocated by the World, but they are, at least based on something more that mere euphony.

# More About Railroad Symphonies

F. H. Beeman writes as follows in reference to various items appearing in this department concerning musical compositions built on a railroad motif:

"Referring to the item on page 596 of your issue of February 26, relating to the composition of music on a railroad theme, in which you mention the report of some years ago that a famous

European composer was working on a railroad symphony that did not materialize.

"Has your attention ever been directed to the French modernist composer, Honneger's, 'Pacific 231' symphonic tone poem, intended to portray the romance of modern railway locomotive? This number has been performed with considerable success by the Los Angeles Philharmonic Orchestra, the Hollywood Bowl Orchestra and the San Francisco Symphony Orchestra."

Bernard Hoffman of Santa Barbara, Calif., writes us to the same effect.

The composer is reported to have made arrangements with an English railway to permit him to ride in the locomotive cab of a fast passenger train. He wishes to hear the sounds which an engineman experiences, with the idea of translating them into music. Perhaps a new railroad symphony may result. In some respects, however, a musical composition based on sounds heard in an English locomotive cab (or perhaps we should say "on the footplate") may leave something to be desired to the American ear. For one thing the attentive listener will surely miss the frequent recurrence of the sound of the bell, which the composer would certainly include if he were gaining his experience on this side of the Atlantic.

# Optimism in Railroad News

Washington newspaper men who "cover" the Interstate Commerce Commission regularly—those whose opinions receive such wide publicity when attributed to "officials who declined to be quoted"—have a new definition of an optimist. The definition is applied to the correspondents of Pennsylvania papers who call up daily to ask if the commission's decision in the lake cargo coal rate case is out yet. When reminded that this case was argued only as late as last month, one of these remarked that, as the commission has been deciding this case for sixteen years, he thought it might have acquired a certain degree of facility in it by this time.

The "regulars" at the I. C. C. press room are not optimists, after having decided the Van Sweringen merger case about once a week for a year or so before the commission itself decided it differently. There was one man who regularly published his forecast of what the commission's decision would be at the opening of each important hearing he "covered," but he is now engaged in some other field of activity.

Another group of optimists, from various parts of the country, have been besieging their Washington representatives for the past two weeks for the commission's decision in the O'Fallon recapture case, but the commission has thus far failed to make good on the various positive predictions that it would be announced next day.

Former Commissioner C. C. McChord used to have a ready answer for newspaper men who became too inquisitive as to when or how the commission would decide a case. Reaching toward his hip pocket he would ask politely: "Have a chaw of tobacco?"

Perhaps the most optimistic class of all is that composed of the newspaper editors who wire "queries" to their Washington correspondents regarding the latest rumor of a railroad merger in the making, one for which the application to the commission might be ready for filing with the commission in six months to a year or so if the rumor were true. Such queries seldom elicit any information from the commission but they often produce results in the form of stories of even bigger mergers. One correspondent, not too familiar witl: the names of the railroads, simply consolidated Mr. Loree with the Pennsylvania and the Van Sweringens with the Baltimore & Ohio and New York Central, thereby leaving nothing further to the imagination, but a possible future combination of Morgan & Co., and Kuhn, Loeb & Co.

# NEWS of the WEEK

P. R. R .- Photo by C. Parker

THE NORTHERN PACIFIC has granted shopmen an increase in pay of two cents an hour for men receiving from 41 to 80 cents an hour and one cent for those receiving 80 cents or more.

THE NEW ENGLAND RAILROAD CLUB will hold its next meeting on April 12, at Boston, Mass., when a paper will be read on "Steel Rails" by C. W. Gennet, Jr., representative of the Robert W. Hunt Company.

THE CANADIAN RAILWAY CLUB will hold its next meeting on April 12, at 8:30 P. M. when a paper will be read on "Oxygen—The Wonder Worker," by Mr. W. H. Ludington, manager of railroad engineering department, Air Reduction Sales Co. of New York.

THE CENTRAL RAILWAY CLUB will hold its next meeting on April 14, at Hotel Statler, Buffalo, N. Y., when a paper will be read on "Car Retarding" and "Power Operated Hump Classification Yards" with three reel film picture by Albert G. Moore, advertising manager, General Railway Signal Company of Rochester, N. Y.

The Clerks and Freight Handlers of the Chicago & North Western having demanded increases in wages of 15 cents an hour, the matter is to be arbitrated before the Federal Mediation Board. In refusing the demand the railroad company claims that the increase, affecting 8,000 employees, would add 25 per cent to the payrolls.

THE ST. LOUIS-SAN FRANCISCO Association of Metal Crafts and Car Department Employees on March 16 voted against the proposal to amend the working agreement between the association and the railroad, so as to permit the management to put into effect a five-day week rather than a curtailment of the number of men employed, if the necessity should arise for cutting expenses.

THE MISSOURI SENATE has engrossed the Wammack bill to amend the state income tax law so that railroads incorporated in Missouri will not be required to pay income taxes except upon their business within the state. The House has passed a similar bill. Under the existing law,

Missouri railroads must pay taxes on net incomes derived from the entire system, while other railroads pay only on their Missouri business.

The Boston & Maine, following discussions with its station agents, telegraphers and towermen, has agreed with them upon an increase in wages averaging slightly less than four per cent. The telegraphers accepted certain changes in working rules. The representative of the employees in the negotiations was L. M. Eddy, vicepresident of the Order of Railroad Telegraphers.

The board of arbitrators which has considered the controversy between the Boston & Maine and its enginemen and firemen concerning lengthening of runs, has decided in favor of the company, holding that the passenger runs from Boston to Troy, 192 miles, do not cause extensive strain or unreasonable hardship on the men. S. H. Hoff, representative of the employees on the board, dissented.

THREE EMPLOYEES of the New York Central, one yard conductor and two electricians, arrested in New York City on March 18, are charged with stealing from postal cars and platforms in the Grand Central Terminal and it is said that the thievery has been going on for two years. Things were taken also from sleeping cars and dining cars. It is said that the thieves pushed mail bags off the platform, preparatory to rifling them of merchandise, and that in carrying packages away, they mingled with the crowds of passengers from incoming trains.

# New York State Law on Abolition of Crossings

The Supreme Court of New York, appellate division, second department, in a suit wherein the Transit Commission of the State sought an order to compel the Staten Island Rapid Transit (Baltimore & Ohio) to abolish grade crossings at four places on Staten Island, has decided in favor of the commission. The abolition of these crossings, having been found necessary in the interest of public safety, the State commission has plenary power to require the

railroad to proceed with the work. Neither prospective bankruptcy nor engagement in insterstate commission can impair this sovereignty over the soil. The railroad company had appealed from the order on the ground that the cost of the proposed improvement would force it into bankruptcy.

# Shops Burned

The shops of the Louisville & Nashville at Boyles, Ala., were damaged by fire on March 16 to the estimated extent of \$100,000. The flames are said to have been started by a motor in the planing mill. The shops of the Western Maryland at Elkins, W. Va., were damaged by fire on March 17; estimated loss, including 21 new freight cars, \$200,000.

# Canadian Railways' Immigration Policy

A new three-year agreement between the Federal Department of Immigration and Colonization at Ottawa and the Canadian railways has been effected.

The agreement, in brief, gives to the railways a comparatively free hand in bringing agricultural immigrants into the Dominion from southern European countries. The Immigration Act and order-in-council supplementing it provide that all immigrants from these non-preferred countries must be certified agriculturists. The difficulties in the past have been that the department and the railway companies could not always agree as to which were agriculturists and which were not.

Under the agreement, which will remain in force for three years, but which may be terminated by either party on one year's notice, the federal department agrees to accept certificates of personal representatives of the colonization departments of the Canadian Pacific and the Canadian National stationed at Continental ports. The department, however, reserves the right to deny admission to immigrants even if certified by the railways, on grounds of health or morals.

On their part, the railway companies agree, in return for the right to issue the e certificates, to insure employment to the immigrants brought in.

# Pennsylvania Offices Moved

Pennsylvania Railroad employees to the number of 5,500 are this week moving into the company's newly completed office building at 15 North 32nd street, Philadelphia, adjacent to the present West Philadelphia station. The executive departments of the company will remain in Broad Street station as at present. Only those offices and departments which have been accommodated in the several annexes and in leased space will move to the new structure. The office of superintendent of car service goes first. Five days are required to transfer this one office alone. The insurance and accounting departments take 20 days. The moving will continue until May 12. The new office building is 14 stories high, of steel and brick and fireproof.

The new building is the first unit completed in connection with the development of the company's large improvement program on the west bank of the Schuylkill River, which centers around the construction of the new passenger terminal.

### Proposed Laws in Pennsylvania

Two bills before the legislature of Pennsylvania would require 8-wheel cabooses on all railroads and require the employment of a flagman on every locomotive that is run over the road without cars. At a hearing held in Harrisburg on March 22, a representative of the fireman's brotherhood, arguing for the last named bill, said that enginemen and firemen are not clothed properly to leave the cab to go out with a flag. A representative of the Pennsylvania said that the enactment of such a law would require that road to employ additional men at a cost of \$1,737,172 annually.

A representative of the brakeman's

brotherhood argued in favor of the caboose bill, which would make the minimum length of cabooses 24 ft. It was said that 20 states have compulsory laws of this kind, and the brakemen say that they were forced to come to the legislature because "the railroad companies had refused to adjust the question." A representative of the Pennsylvania said that on that road 2017 cabin cars are in use and that, if this bill should pass, the road would have to purchase 487 new units at a cost of \$1,850,600.

# Western Wage Hearing to Be Held in Chicago

The demands of the general chairmen of the Order of Railway Conductors and the Brotherhood of Railroad Trainmen on railroads in the territory west of Chicago for increases in wages of conductors, trainmen and yardmen equal to 71/2 per cent of their present wages, will be arbitrated in Chicago by six men selected by the railroads and the brotherhoods. This action follows a series of conferences between union officers and members of the conference committee of managers on western railways held at Chicago since March 4 in which Edwin P. Morrow and Samuel E. Winslow of the mediation board participated. The employees ask for the 71/2 per cent increase because that is the amount granted recently to men in the east. The conference committee estimates that the increase asked for would cost the railroads between \$11,000,000 and \$12,000,000 annually and would be the forerunner of wage demands by other classes of employees aggregating \$80,000,-000 annually. The western roads claim that their net earnings do not justify this increase, being smaller than those of the eastern and southeastern roads.

# Railroads Responsible in Strike

Loss to shippers because of delay occasioned by peaceable railroad strikes must be borne by the railroads, the St. Louis court of appeals held in passing on the suit brought by Frawley and Schimpff, livestock shippers, against the Atchison, Topeka & Sante Fe for a loss because three carloads of cattle shipped in 1922 were delayed as the result of a strike of railroad employees. Circuit Judge Falkenhainer ruled for the shippers in the lower court and the railroad appealed from his decision, which was affirmed by the appellate judges. The appellate court says: "There ought to be no question as to the liability of the carriers for loss or damage occasioned by the mere abandonment of the service by its employees either in common law or under statute. If the strikers, after having abandoned the service of the carrier, proceed by lawless violence to obstruct the movement of trains, a different case is presented. But that the shipper should be required to bear the loss or damage resulting from a strike which is the outgrowth of contentions between the carriers and their employees and which goes no further than the peaceable withdrawal of the employees in the service of the carriers, does not appeal to a right sense of justice. We think it was one of the objects of the statute to prohibit exemption from liability for loss or damage so resulting by contract, receipt, rule, regulation, or other limitations of any character whatsoever.

The livestock in question was delivered to the Sante Fe at Kansas City, Mo., for shipment to the national stock yards at St. Louis. The cars were switched to the Missouri Pacific to be taken to St. Louis. The shopmen's strike was then in progress and the same evening the conductors, enginemen, trainmen and firemen in freight service walked out at Jefferson City, Mo., and

# Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled from the Monthly Reports of Revenues and Expenses for 189 Steam railways, including 14 switching and terminal companies

			FOR THE	MONTH OF JA	NUARY, 1927	AND 1926				
	Unite	ed States	Eastern	District	Pocahont	as Region	Southern	Region	Western	District
Item	1927	1926	1927	1926	1927	1926	1927	1926	1927	1926
Average number of miles										
Revenues:	237,901.29	237,121.82	39,390.64	38,992.45	133,491.21	133,152.11	59,463.93	59,428.58	5,555.51	5,548.68
Freight	357.840.124	\$347,798,263	\$158,855,016	\$150.119.840	\$20,581,080	\$19,127,996	\$50.241.034	\$52,955,651	\$128,162,994	\$125,594,776
Passenger	a 85.974.997	b 89,594,278	43,045,989	42,351,913	1,914,723	1,970,776	13,152,124	16,279,757	27,862,161	28,991,832
Mail	7,867,137	8,013,644	2,956,332	2,976,573	195,171	216,566	1,179,742	1,218,260	3,535,892	3,602,245
Express	8,797,605	9,811,943	4,109,826	4,542,056	197,148	217.877	1,112,517	1,540,363	3,378,114	3,511,647
All other transportation	15,550,855	15,536,321	8,653,177	8,794,691	188,353	186,779	870,138	964,624	5,839,187	5,590,227
Incidental	10.181,058	9,985,825	5,317,691	5,004,717	371,797	352,495	1.341.036	1.550,699	3,150,534	3.077,914
Foint facility-Cr	1,236,136	1,081,830	524,551	423,803	10.890	13,586	169,850	142,723	530,845	501,718
Joint facility-Dr	443.576	403,913	138,237	137,361	3,140	2,104	30,810	34,255	271,389	230,193
Ry. operat'g revenues		481,418,191	223,324,345	214,076,232	23,456,022	22,083,971	68,035,631	74,617,822	172,188,338	170,640,166
Expenses:	407,004,330	401,410,171	223,027,073	214,070,202	20,430,022	44,003,771	00,000,001	74,017,022	112,100,000	270,010,200
Maintenance of way and										
C. T. C.	59,857,245	58,873,070	25,688,955	25,649,355	3,144,668	2,838,933	9.744,686	9.841.848	21,278,936	20,542,934
Mainten'ce of equipm't	106 120 275	105,464,167	51,569,275	50,214,524	5,113,238	4,814,228	13,669,544	14.027.883	35,768,218	36,407,532
Traffie	9,851,363	9,018,107	3,628,245	3,270,464	241,909	240,653	1,851,840	1,732,616	4,129,369	3,774,374
Transportation	191,541,180	186,901,559	92,552,942	87,291,895	6,582,650	6,583,450	25,446,900	27,303,552	66,958,688	65,722,662
Miscellaneous operations	4,809,324	4,575,043	2,308,549	2,133,704	88,313	97,152	631,458	693,422	1,781,004	1,650,765
General	16,293,434	15,172,931	7.578.019	6,923,625	547,743	469,451	2,126,733	1,970,373	6,040,939	5,809,482
Transportation for in-	10,273,434	15,172,931	7,370,019	0,923,023	347,743	409,431	2,120,733	1,970,373	0,040,233	3,003,402
	983,459	1,071,569	181,950	166,173	18,317	32,999	212,733	282,250	570,459	590,147
Ry. operat'g expenses.	387,489,362	378,933,308	183,144,035	175,317,394	15,700,204	15,010,868	53,258,428	55,287,444	135,386,695	133,317,602
Net revenue from rail-	307,409,302	3/0,933,300	103,144,033	1/3,317,394	13,700,204	13,010,000	33,430,440	33,207,444	133,360,093	133,317,002
way operations	99,514,974	102,484,883	40,180,310	38,758,838	7,755,818	7.073,103	14,777,203	19,330,378	36,801,643	37,322,564
Railway tax accruals	29,338,232	28,660,890	11,168,205	10,999,750	1,779,638	1,519,956	4,122,717	4,410,201	12,267,672	11,730,983
Uncollectible ry. rev's	102,936	110,755	29,554	50,675	1,779,638	2,993	14,420	11,061	57,410	46,026
By conection ry. rev s	70 072 906				5,974,628		10,640,066	14,909,116	24,476,561	25,545,555
Ry. operating income Equipm't rents—Dr. bal.	70.073,806	73,713,238	28,982,551	27,708,413		5,550,154			2,520,550	1,868,524
Joint facility rent-Dr.	6,583,554	5,929,379	3,722,112	2,767,792	c 385,271	c 572,511	726,163	1,865,574	2,320,330	1,000,324
balance	1.911.557	2,022,583	881,186	813,783	94,279	105,340	62,801	103,912	873,291	999,548
Net railway operating	-,,	-,,	,							
ncome	61,578,695	65,761,276	24,379,253	24,126,838	6,265,620	6,017,325	9,851,102	12,939,630	21,082,720	22,677,483
Ratio of expenses to		2011-0-121-0	2.,10.7,200	3.,,	-,,					
revenues (per cent)	79.57	78.71	82.01	81.89	66.93	67.97	78.28	74.09	78.63	78.13
a Includes \$3,338,512	sleeping an	d parlor car	surcharge.	b Includes \$3,				arge. c Def	ficit or other	reverse item.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

other division points of the Missouri Pacific because that railroad had sanctioned the placing of United States marshals and guards at each point. The stock was held over a day.

# Courtesy on the Illinois Central

The feeling of the traveling public toward the Illinois Central—the people's appreciation of the good service of the trainmen—is so pronounced that the Supreme Court of Mississippi takes judicial notice of the fact. L. A. Downs, president of the road, in a letter addressed to all employees says:

"Courtesy advertises our service, attracts patronage and makes for pleasant relations with the public generally. One courteous act often causes many persons to praise and use our service, and the good will which our railroad enjoys is due in no small part to the pleasing manner in which our employees perform our service.

"The reputation for courtesy which our railroad bears is something of which we all are proud.

"Therefore, I take great pleasure in calling your attention to the following excerpt from a recent decision of the Mississippi Supreme Court in a case in which our railroad was concerned:

"It is very unusual, and in fact almost unknown, for a passenger train employee on the Illinois Central System to be discourteous or impolite to a passenger. It is commonly known, and for this reason we cannot be ignorant of the fact, that this great railroad system has the enviable reputation throughout the United States of having the most courteous and accommodating employees of any railroad system."

"A reputation so outstanding as to receive such recognition is worth maintaining. Let us guard it carefully."

# A Library on Rails

A "library car" operated by the Missoula County Free Library in cooperation with the Anaconda Copper Mining Company is a new development of library extension service, according to the American Library Association. The library is a box car painted gray and carrying the sign "Missoula County Free Library." The car is moved forward as the logging advances and the men are working farther in the forest.

The inside of the car is well lighted, heated, and comfortably furnished with a long table and arm chairs. Open book cases extend around two-thirds of the walls and at one end is the librarian's office. Here the necessary clerical work is done and small bundles of books are made up to be packed, either by man or by horse, to camps perhaps five or six miles from the car.

The librarian is an employee of the company, and being a lover of books, is thoroughly interested in the work, reports regularly to the county librarian and sends in special requests as they are made. One man was helped to obtain a patent on a water power device; another sup-

plied with material for his correspondence course and to a young college student were sent plays and books upon the drama.

For three months of the year just ended the car was closed due to the fact that the company was moving from one logging project to another, but during the remaining months more than 5,000 men visited the car and 3,200 books were lent. The idea of providing the library car is credited to Kenneth Ross, who was in charge of logging operations of the Anaconda Copper Mining Company.

# B. & O. to Paint Locomotives Green and Name Them

Twenty new locomotives, which will be delivered to the Baltimore & Ohio Railroad next week by the Baldwin Locomotive Works, will be painted olive green, striped with red and gold, and put into service on the passenger trains between Washington and New York. They will also bear the names of the Presidents of the United States, in addition to the usual numerical designation, commencing with the first president. No. 5300 will become the "President Washington;" No. 5301, the "President Jefferson," down to President Arthur.

The new color scheme, says the announcement, was adopted for these locomotives in order to have the whole train harmonize. The coaches and sleeping cars, as well as the mail, express and baggage cars, in use on the Baltimore Ohio are olive green and the new locomotives will match this hue, with a little touch of red and gold added to enhance their appearance.

The following parts of the 20 new passenger locomotives will be painted:

Baltimore & Ohio Standard Coach Olive Green— Tender Tank, Cab, Sand Box, Steam Dome, Bell Stand, Cylinder Jacket and Saddle, Cylinder and Steam Chest Head Casings; Engine Truck, Driving and Trailer Truck Wheels, Number Plate, Pilot, Bumper, Boiler Jacket, Headlight, Tender Frame and Steps, Tender and Trailer Truck Frames, Deck Plates, Air Reservoirs, Pipes, Signal Lamps, Brake Hangers and other miscellaneous parts visible from outside, that require a smooth finish.

Striping-Red and Gold—

ameous parts visible from outside, that require a smooth finish.

Striping—Red and Gold—
Side of Front Bumper Steps, Cylinder Jacket, Sand Box, Steam Dome, Bumper Pilot, Engine Truck and Driving Wheels, Cab Panels, Sides, Front and Back of Tender Tank at Top and Bottom.

The gold stripes will be ½ in. wide and the red ones, ¼ in. wide, with the red stripes inside the gold stripes. In addition to the painting the valve motion, main and side rods will be polished. The names of the locomotives will be in 3 in. gold letters on each side of the cab and the number will be on the head end and headlight in the ordinary form.

# Good Record Made in Handling of Dangerous Articles

The railroads of the United States and Canada in 1926 handled more than two million freight cars loaded with high explosives, acids, inflammable liquids and other dangerous materials with the loss of only three lives, according to a report for the year just compiled by the Bureau of

Explosives of the American Railway Association. The loss of these three lives was due entirely to explosions of gasoline while in transit. There was not a fatality in 1926 due to the transportation of dynamite and other high explosives or acids, which are carried in large quantities by the railroads.

"The carriers," said the report, "are required to transport many hazardous articles which involves the greatest potential hazard they are called upon to face. Considering only three of the most dangerous articles shipped by rail, the railroads transport each year about five million pounds of dangerous explosives; over five million tons of acids and over twelve billion gallons of gasoline. These three commodities require over 25,000 freight trains of 80 cars each.

The property loss in connection with the transportation of explosives, acids and inflammable materials in 1926, was \$1,114,067, compared with \$1,055,459 in 1925. Eighty per cent of the total property loss, or \$1,008,242, was caused by inflammable liquids in 1926 and 56 per cent, or \$636,647, by gasoline alone.

In 1925, losses due to gasoline amounted to \$647,256.

"Gasoline still holds the leadership of all dangerous articles. It is shipped in by far the largest tonnage and in the greatest average bulk per container. Crude petroleum oil comes next to gasoline as a loss producer.

# Fewer Casualties Among Burlington Employees

The average age at death from sickness among members of the relief department of the Chicago, Burlington & Quincy has increased from 49 years and 9 months in 1890 to 57 years and 6 months in 1920. In the latter year only 39 per cent of the total benefits paid were on account of accidents as compared with 60 per cent in 1906. Deaths due to accidents off duty, however, have increased greatly in the same period. A total of 16 members lost their lives in accidents while off duty in 1926, the number being three times as many as in 1906. Of the 16 deaths, 10 were due to automobile accidents.

The relief department report sets forth that the increase in the span of life represents improved living and working conditions and also shows the value of individuals co-operating with others in all matters affecting health, sanitation, proper food, drinking water, personal hygiene, etc. Attention is called to the large amount of unnecessary loss of wages due to avoidable sickness. Employees lost between 400,000 and 500,000 days' wages in the year because of sickness.

Since the establishment of the department on June 1, 1889, the members have contributed \$17,558,448 and there has been paid to them and their beneficiaries \$17,451,659, a little over half of which was paid on account of sickness. The company pays all the expenses of operation of the department and also guarantees the payment of benefits if the fixed contributions of members are not sufficient. In carrying on

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the relief department work the company has expended in cash \$3,397,321 and in addition has furnished facilities such as offices, the part time of a large number of officers and other employees, etc. On December 31, 1926, a total of 29,874 employees were members, while in addition 2,427 former employees were continuing their membership for death benefit only, making a total membership of 30,301, carrying a total death benefit of \$27,969,300.

# Railways in a National Emergency

M. J. Gormley, chairman of the Car Service Division of the American Railway Association, gave a brief talk before a convention of quartermasters of the U. S. Army at Washington on March 18 on "The Railways in a National Emergency," and was applauded when he said that there need be no fear as to the capacity of the railways in any future war if they are allowed to remain in the hands of railway officers who know how to handle them.

Mr. Gormley outlined the organization, purpose and development of the Car Service Division, saying that in a way the latter is a war organization, experienced in dealing with the emergencies that arise from time to time in the handling of cars. For example, he said that the British coal strike resulted in an increase in coal production in this country to a figure greater than that which resulted from the war, yet it was met without service orders from the Interstate Commerce Commission or interference with other traffic, and that the increase in traffic handled by the railroads in 1926 as compared with any previous year was greater than the war load.

The district managers of the Car Service Division, Mr. Gormley said, have been instructed to co-operate with the army procurement managers in the various districts in relation to the possible demand for railway service in the event of a war so that they may have information as to what the war demand would be and the conditions that would prevail at ports and other points of destination. The presidents of the roads in a given territory would deal with the corps area commanders in relation to such questions as the location of camps, etc.

Among the important factors which ought to be planned in advance Mr. Gormley mentioned the location of camps, warehouses and regulating stations with reference to railroad facilities. One of the camps at which he had experience during the World War was located twelve miles outside a large city on a single-track interurban line and there was not a paved road to it. He recommended that such a site be sold for a golf course and that camps be located alongside a double-track railroad, or preferably two such roads, and that warehouses and regulating stations be located 100 miles back from a seaport where the material could be moved to the port on short notice, rather than be located at the

In case of another war he would also recommend that every seaport be embargoed and freight let in on permits which would be conditioned on ability to handle it on arrival.

# Traffic

The Shippers' Conference of Greater New York has elected as chairman W. H. Chandler, 233 Broadway, manager of the Traffic Bureau of the Merchants Association.

The Interstate Commerce Commission has denied the petitions filed by some of the southern roads for a modification of its findings in the Southern Class Rate Investigation with respect to freight rates to and from points in Florida.

The Missouri Pacific, on March 9, delivered in St. Louis, Mo., a train of 113 cars of perishable freight from the Texas Gulf coast. Sixty-two of the cars contained cabbage and the remaining cars were loaded with mixed vegetables.

The Central Western Shippers' Advisory Board will hold its fifth annual meeting at Casper, Wyo., on June 23, instead of April 7, the latter date having been set for the continuation of the Interstate Commerce Commission hearings on Docket 17,000 at Kansas City, Mo.

Cafe coaches are now in service on the through day express trains of the Pennsylvania between Wilkes-Barre, Pa., and Pittsburgh, in each direction, and between Wilmington, Del., and Cape Charles, Va., in each direction. Each cafe coach has seats for forty passengers in the coach and four tables, seating 16 persons, in the dining end. Heretofore passengers on these trains have depended for food on the buffet in the parlor car.

Beginning April 4, the Baltimore & Ohio will run an "improved beef train" for the information and education of farmers in six counties of Maryland, following which a trip wi:l be made over the line of the Baltimore & Ohio in Virginia. Among other exhibits the train will carry five steers, selected in the Chicago market, to illustrate definitions of the terms by which cattle are graded; choice, good, medium, common and cutter.

The Chicago & Eastern Illinois has adopted the practice of serving afternoon tea to passengers as a permanent feature of its service on the "LaSalle," following satisfactory experiments conducted during the past few months. Each afternoon travelers on this train between Chicago and St. Louis, Mo., are handed printed invitations which read: "At 4 p. m. you are invited to enter the dining car to partake of a hot cup of tea and a sandwich."

The Southern Pacific on April 17 will put on a new passenger train between Portland, Ore., and San Francisco, Cal., to run over the Natron cut-off via Klamath Falls, Ore. It will make the trip in 23 hr. 20 min., compared with 27 hr. required over the Rogue river-Siskiyou route. There will be an extra fare of \$3 on the new train. It will leave Portland at 10:05 p. m. and arrive in San Francisco at 9:25

p. m. the next day. Returning it will leave San Francisco at 4:40 p. m. and arrive in Portland at 4:10 p. m. the next day.

At the request of counsel for the cottongrowers' associations, the Interstate Commerce Commission has cancelled, for reassignment later, a series of hearings that had been announced to be held in various parts of the country in connection with its investigation of cotton rates under No. 17,000, Part 3, and related cases. To avoid conflict with other engagements, the notice says, it will not be possible to reassign the hearings before about the middle of September.

### Rates on Bananas

The Interstate Commerce Commission has found not justified a revision proposed by the railroads of freight rates on bananas from Gulf ports to southeastern, Carolina, and Mississippi Valley territories. Ohio river crossings and other southern points, suggesting instead, a scale of mileage rates for use in revising the The rates proposed by the roads, rates. which had been suspended by the commission, were in purported compliance with its findings in 109 I.C.C. 211, Bananas from Gulf Ports. The report says that in general the suspended rates to southeastern and Carolina territories are not in compliance with the report in the former case and expresses the opinion that a proper revision of the rates can be based on a mileage scale. That suggested by the commission ranges from 32 cents per 100 lb. for distances under 100 miles up to 96 cents for distances over 975 miles and less than 1,000.

# Carl R. Gray Praises Shippers' Boards

"Co-operation between railroads and the public chiefly through the shippers' regional advisory boards has established a relationship between the public and the carriers that has brought the latter into favor such as we would not have dared to dream about a few years ago," President Carl R. Gray of the Union Pacific, said in speaking to members of the Chicago Association of Commerce on March "These advisory boards, in which state railroad commissioners also participate, are a clearing house for all interests and they are solving many questions. The chief benefit has been in service and the net result has brought about a condition that is approaching perfection. Merchants have been able to reduce stocks of merchandise between seven and eight billions of dollars. This vast amount of money has been released for other useful purposes. Another sign of the times is that there was not a single piece of restrictive railroad legislation passed by any state legislature in the country at their sessions two years ago, and so far as I can

learn, no such measures are contemplated at the next legislative sessions. Anothevidence of the change of conditions is the attitude of the press of the country. It is now a rare thing to see in any newspaper any article criticizing a railroad."

# Summary of Pennsylvania Mileage

The annual summary of line and track mileage of the Pennsylvania system recently completed shows that for all of the operating companies included within the system, the total line mileage at the close of the year was 11,640.66 miles. In addition. there were 4,363.11 miles of second track, 939.69 miles of third track, 710.10 miles of fourth track, and 10,386.93 miles of sidings, which brings the total of all tracks to 28,040,49 miles. In maintaining this extensive mileage of tracks during 1926, 217,-995 tons of steel was required for rail renewals and 5,381,042 cross ties. The rail renewals for the year represented an increase of 14,323 tons over the previous high record established in 1925 and reflect in particular the increased use of heavy sections, especially that weighing 130 lb. to the vard. The most recent figures in this regard show that more than 60 per cent of the Pennsylvania's 4,441 miles of main tracks is laid with 130 lb. rail and more than 5 per cent with 125 lb. rail.

### Correction

In last week's issue an item was published which attempted to say that the Interstate Commerce Commission, under the amendments to the interstate commerce act contained in the Newton bill which became a law on March 4, has begun making its suspensions of rates for a period of seven months, instead of for 120 days with a possible resuspension for another 30 days, which was the practice under the law before the amendment. As published the item was somewhat mixed up and indicated that the possibility of resuspension remains under the new law. The Newton amendment, which was adopted in place of a recommendation by the commission that the period of suspension be made ten months, provides that if the commission's proceeding of investigation has not been concluded in seven months the suspended rate shall go into effect; but the commission may by order require, in case of a proposed increase, that the carrier or carriers keep an accurate account so that the commission may require a refund of such portion of the increased rate as by its decision shall be found not justified.

# Freight Claims in Louisiana Subject to Statute of Limitations

The Supreme Court of the United States holds that provisions in bills of lading that suits for loss must be brought within two years and one day after delivery are in violation of the Transportation Act, which declares unlawful any limitation shorter than two years from the time notice is given of the disallowance of the claim; and such provisions are therefore ineffective. The Transportation Act and

the Cummins Amendment, however, do not operate as statutes of limitation. They restrict the freedom of carriers to fix the period within which the suit can be brought.

On goods shipped from Louisiana to Kentucky under bills of lading requiring suit for loss within two years and a day after delivery the consignor sued in a Louisiana state court; and the railroad successfully relied on the local statute of limitation requiring suits within two years from date of shipment. The Louisiana Court of Appeal, however, on appeal, held that the state law of limitation was superseded by federal legislation, which governed the time for suit.

The United States Supreme Court reverses judgment of the Court of Appeal, holding that there is no federal statute of limitation and that the state statute controls.—Louisiana & Western v. Gardiner. Opinion by Mr. Justice McReynolds. Decided February 21, 1927.

# Railroads Oppose Joint Routes Via Barge Line

Declaring that it is "much more in the public interest that the weak spots in the national transportation system be strengthened than that the operation of a few barges on a shallow river be encourthe northwestern railroads have filed a brief with the Interstate Commerce Commission opposing the complaint of the Inland Waterways Corporation which asks the commission to establish joint rates and through routes via the roads and the barge line on the upper Mississippi river. 'The rail carriers in the western district are making every effort to improve their ability to serve the public," the brief asserts. "To do this, they need additional revenue and need it badly. In this effort they should be encouraged rather than handicapped.

"Congress has left the establishment of water and rail routes and rates almost wholly to the discretion of this commission. The only policy which it has indicated as applicable to the establishment of such routes and rates is that the commission find them in the public interest. It cannot be said that the establishment of the rail and barge routes here in question is in the public interest when consideration is given to the finding of the commission in Ex Parte 87 Docket 17,000, that rates on products of the farm should not be increased. The jeopardizing effect on the farm interests would be two-fold: carriers would be crippled in their ability to handle any traffic in this territory; and in order to make a fair return on their investment they probably would be obliged to ask for an increase on the agricultural products from which their revenue is largely derived.

"We therefore believe that if the popular fallacy that water transportation is to be encouraged under all circumstances—without regard to the provisions of the transportation act, 1920, or the adverse financial condition of the railroads affected—is eliminated, and the evidence and facts are viewed with a clear perspective, the commission will refuse to be a party to the establishment of an additional transpor-

tation system as economically unsound as is this barge line, and will refuse to be a party to the further tearing down of a very essential part of the national transportation system."

# Canadian Grain Rates Discussed at Hearing

Inequalities of Canadian freight rates East and West and the large movement of Canadian grain over the railways and out through United States ports were discussed at last week's sitting of the Dominion Railway Board at Ottawa. The Board is still engaged in the general rate equalization case, and considerable time was taken last week by one of the Board's members, Commissioner Frank Oliver of Edmonton, Alberta.

On more than one occasion in the course of the inquiry, Mr. Oliver has made special reference to the percentage of Canadian grain which finds its outlet every season through United States ports. That this percentage is steadily growing against the Canadian ports notwithstanding the fact that the business originates in Canada, he says, is a very serious national problem, for which it should be the special duty of all concerned, including the Railway Board itself, to find, if possible, a practical solution.

The commissioner compared a number of ratings East and West, where the distances, the character of the road, and all other conditions were practically identical and showed that the rate from western points to the head of the Lakes was lower than from Winnipeg to St. John, N. B., and he contended that if the latter rate was reduced to the same scale the difference would pay three months' shortage and thus encourage the farmers to bring in their grain all through the winter and provide business for the railways and Canada's winter ports. Thus the traffic would be equalized and peak load during the heavy three months, October to December, relieved. "If," declared the commissioner, "the producer and dealer in the West knew he could get his grain on the market all through the winter he would not be so anxious to get through before navigation closes. The railways would also be relieved and everybody concerned would be benefited."

Speaking for the railways, Alistair Fraser, Canadian National Railways counsel, declared that Commissioner Oliver's proposal had injected an element which would revolutionize the whole course of the inquiry.

"When we see the way the United States is taking away our legitimate trade," retorted Commissioner Oliver, "it seems to me we want a revolution or something drastic. I consider nothing more serious or important from a national standpoint has ever occupied the attention of this board."

Continuing, Mr. Fraser declared that the 10,000 cars which his railway had available for the grain-carrying trade would not be a circumstance in moving 80,000,000 bushels of grain. They would need probably 1,000 more locomotives and an expenditure for new rolling stock totaling at least \$20,000,000. He confessed that he had been taken by surprise by the sudden introduction of

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this feature, and declared that it would require extensive study and preparation to meet the new development.

E. P. Flintoft, counsel for the C. P. R., asserted that in addition to extra rolling stock it would need the double tracking of 600 miles of the C. P. R. road to handle the winter traffic.

# Jurisdiction Over Intrastate Traffic in Guaranty Period

The Interstate Commerce Commission has issued a decision in Ex Parte No. 88 holding that it has jurisdiction to approve after August 31, 1920, an award of reparation made by state authority on intrastate traffic which moved during the period March 1 to August 31, 1920, the so-called "guaranty period" following the termination of federal control. Commissioners Hall, Taylor, Meyer and Woodlock dissented. The majority report says in part;

Upon further consideration, we conclude that our authority to approve awards of reparation on intrastate shipments which moved during the guaranty period did not expire on August 31, 1920, but that we were given authority to approve such awards upon traffic which moved during the guaranty period whether such authority was actually exercised during the guaranty period or thereafter. The phrase "prior to September 1, 1920," as used in section 208 (a) of the transportation act, 1920, apparently is not to be construed as prescribing a time limitation within which we were authorized to act, but as fixing the period as to which our approval was necessary to a reduction in rates whether made during the guaranty period by the naming of lower rates for the future, or accomplished after the expiration of the period by way of reparation on shipments which moved during the period.

Subject to certain exceptions not here pertinent, our jurisdiction over intrastate rates terminated on February 29, 1920, with the termination of federal control. On that date jurisdiction over such rates passed to the state authorities, subject to the sole limitation that no rates should be reduced prior to September 1, 1920, unless the reductions were approved by us. It appears, therefore, that we were, and are, without power to require reductions in rates or to award reparation on intrastate shipments during the guaranty period and that the only order we can lawfully make as to such shipments is one of a respective character.

shipments is one of a permissive character. We adhere to our conference ruling of March 13, 1922, and previous decisions to the extent that they hold that section 208 (a) of the transportation act, 1920, does not authorize us to award reparation on intrastate shipments which moved during the guaranty period. We now hold, however, that we have authority under that section to approve after August 31, 1920, awards of reparation by State authority on intrastate traffic which moved during the guaranty period, and the conference ruling will be modified accordingly. We are of the opinion that the power to approve necessarily implies the power to approve in whole or in part, or to disapprove, but does not include the power to enlarge the award.

Commissioner Hall in a dissenting opinion said that if Congress had given the commission a continuing jurisdiction to pass on intrastate rates "surely the grant of that jurisdiction must clearly appear in some act of Congress."

# Equipment and Supplies

# Locomotives

THE MUKDEN & HAILUNG (China) has ordered four Mogul type locomotives from the Baldwin Locomotive Works.

THE APALACHICOLA NORTHERN has ordered one 4-6-0 type locomotive from the American Locomotive Company. This locomotive is to have 19 by 26-in. cylinders and a total weight in working order of 136 000 lb.

The New York, New Haven & Hartford has ordered six three-cylinder, eightwheel switching locomotives from the American Locomotive Company. These locomotives are to have 22 by 28-in. cylinders and a total weight in working order of 246,000 lb.

THE CHICAGO & NORTH WESTERN has ordered one 60-ton Diesel electric switching locomotive from the Ingersoll-Rand Company, the General Electric Company and the American Locomotive Company. Inquiry for this equipment was reported in the Railway Age of March 5.

# Freight Cars

The Dick Construction Company, Hazleton, Pa., has ordered 12 dump cars from the American Car & Foundry Company.

THE EASTMAN KODAK COMPANY, Rochester, N. Y., has ordered one 8,000-gal. special tank car, from the General American Tank Car Corporation.

THE DETROIT EDISON COMPANY has ordered one transformer transfer car from the Pressed Steel Car Company, to be built at the shops of its Koppel works.

The Great Northern has ordered 50° steel underframes for automobile cars from the Pressed Steel Car Company. Inquiry for this equipment was reported in the Railway Age of March 19.

THE MINNEAPOLIS, ST. PAUL & SAULT STE MARIE has ordered 84 caboose car underframes from the Standard Steel Car Company. Inquiry for this equipment was reported in the Railway Age of March 12.

The Denver & Rio Grande Western has ordered 300 automobile cars of 40 tons' capacity from the Mt. Vernon Car Manufacturing Company. Inquiry for this equipment was reported in the Railway Age of March 19.

THE ATCHISON, TOPEKA & SANTA FE has ordered 150 eight-wheel caboose cars, 29 ft. long, from the American Car & Foundry Company. Inquiry for this equipment was reported in the Railway Age of March 5.

THE MISSOURI PACIFIC has ordered 300, steel underframe, double sheathed, box car bodies, of 40 tons' capacity and 36 ft.

long from the American Car & Foundry Company. Inquiry for this equipment was reported in the Railway Age of March 19.

THE PERE MARQUETTE has ordered 20, 30-cu. yd. trunnion type air dump cars from the Pressed Steel Car Company, to be built in the shops of its Koppel car works. The Pere Marquette is inquiring for 1,000 box cars, 250 coal cars and 250 gondola cars.

THE CARBIDE & CARBON CHEMICAL COR-FORATION, New York, has ordered 10 tank cars from the General American Tank Car Corporation. The Union Carbide Company, Niagara Falls, has ordered 4 hopper bottom ore cars of 50 tons' capacity from the American Car & Foundry Company. The companies ordering this equipment are subsidiaries of the Union Carbide & Carbon Corporation.

# Passenger Cars

THE RICHMOND, FREDERICKSBURG & POTOMAC has ordered one dining car from the Pullman Car & Manufacturing Corporation.

THE NORTHERN PACIFIC has ordered three 72-ft. mail, baggage and passenger gas-electric motor cars equipped with Model 120-275 hp. power plants from the Electro-Motive Company.

The Wabash has ordered 6 combination passenger and baggage cars from the St. Louis Car Company; 6 combination passenger and baggage, 10 chair cars and 8 coaches from the American Car & Foundry Company; 6 dining cars, 2 cafe chair cars and 4 lounge cars from the Pullman Car & Manufacturing Corporation. Inquiry for this equipment was reported in the Railway Age of January 23.

# Machinery and Tools

The Boston & Maine has ordered two grinding machines from the Niles-Bement-Pond Company.

THE NEW YORK CENTRAL has ordered four grinding machines from the Niles-Bement-Pond Company.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered one grinding machine from the Niles-Bement-Pond Company.

THE CHICAGO & EASTERN ILLINOIS has ordered two car wheel borers and an axle lathe from the Niles-Bement-Pond Company.

The St. Louis-San Francisco is inquiring for one bending roll, one locomotive boiler washer and filler, one heavy duty face grinder, one portable locomotive cylinder or flange facing machine, one electric flue welding mahine, two pipe threading machines, one valve setting machine, one shaper, one portable journal truing machine and one internal grinder.

The Atchison, Topeka & Santa Fe is inquiring for one heavy duty engine lathe, one plain milling machine, one portable lathe, one portable engine lathe, two heavy duty engine lathes, one heavy duty friction-head engine lathe, one back-geared crank shaper, one heavy-duty turret lathe, one 600-ton cantilever press, three heavy-duty planers, one horizontal plain high power miller, one double-head bolt cutter, two upset and forging machines, one automatic staybolt cutting off machine, one crank planer, one flat turret lathe and one hydraulic press in addition to the list reported in the Railway Age of March 19.

# Iron and Steel

THE CHESAPEAKE & OHIO is inquiring for 300 tons of steel.

THE SEABOARD AIR LINE has ordered 300 tons of steel from the Virginia Bridge & Iron Company.

THE VIRGINIAN has ordered 200 tons of steel for bridge work from the Virginia Bridge & Iron Company.

THE PENNSYLVANIA has ordered 500 tons of steel for bridges from the Beth-lehem Steel Company.

THE READING COMPANY has ordered 500 tons of steel for bridges, from the Beth-lehem Steel Company.

The Delaware, Lackawanna & Western has ordered 2,200 tons of steel for bridge work from the American Bridge Company.

THE LOUISVILLE & NASHVILLE has ordered 4,000 tons of structural steel for bridge work in Alabama from the McClintic-Marshall Company.

# Miscellaneous

THE PERE MARQUETTE has placed an order with the Manitowoc Shipbuilding Company for a car ferry.

# Signaling

THE SOUTHERN has ordered from the General Railway Signal Company an electric interlocking for Atlanta, Ga., 24 levers.

The New York, New Haven & Hartford has ordered from the Union Switch & Signal Company, an electric interlocking, type F, to be installed at Springfield, Mass., a 47 lever machine, 26 switch-andlock movements and other material.

The Chicago, Rock Island & Pacific has ordered from the Union Switch & Signal Company, 57 color light signals, 13 dwarf signals and other material for use in connection with double-tracking on the Kansas division between Volland, Kan., and Jones.

THE CITY OF BOSTON has ordered from the Union Switch & Signal Company material for automatic block signals on the Dorchester Rapid Transit extension, 3½ miles, double-track. About one mile of this line is within the subway. The order includes 38 color-light signals, 52 automatic stops and other material.

THE CHICAGO GREAT WESTERN has ordered from the Union Switch & Signal Company material for automatic block signals between South DesMoines, Iowa, and Diagonal, 75 miles, single track; 61 color-light signals, 217 relays and other material.

The Michigan Central has ordered from the General Railway Signal Company 100 inductors to be installed on its line between Niles, Mich., and Kensington, Ill., 80 miles, double track. With the completion of this addition, the Michigan Central will have intermittent, inductive, automanual, automatic train control in use from Detroit to Kensington, 270 miles.

THE CHICAGO, BURLINGTON & QUINCY has ordered from the General Railway Signal Company material for the installation of automatic block signaling on 218 miles of road as follows: Macon, Mo., to Monroe, Mo.; Palmyra Junction, Mo., to Mock, Mo.; Dorchester, Nebr., to Harvard, Nebr.; Culbertson, Nebr., to Wray, Colo.; and Kensesaw, Nebr., to Holdrege, Nebr. The order includes 375 color light signals and other material.

The Long Island has contracted with the Union Switch & Signal Company for the installation of automatic train stops on the North Shore division; the Union coded continuous system. The installation will be from Harold Avenue, Long Island City to Port Washington and from JC Tower to Whitestone Landing. Equipment is to be provided for 44 multiple-unit passenger cars now in service and for 120 M.U. cars which are now being built in the manufacturers' shops.

# Santa Fe Orders Signals for 263 Miles

The Atchison, Topeka & Santa Fe has ordered from the Union Switch & Signal Company automatic signals for different parts of the system as follows:

Eastern lines: Holliday, Kan., to Lawrence, 27 miles, single track; Guthrie, Okla., to Oklahoma City, 31 miles, single track; Wichita, Kan., to Mulvane, 3 miles, single track; Ponca City, Okla., to White Eagle, 4 miles, double track.

Western lines: Pampa, Tex., to Panhandle, 27 miles, double track; and five sections of single track as follows: Becker, N. Mex., to Mountainair, 25 miles; Waynoka, Okla., to Curtis, 21 miles; Canadian, Tex., to Pama, 44 miles; Curtis, Okla., to Alston, 9 miles.

Gulf lines: Belleville, Tex., to Somerville, 20 miles; Fort Worth, Tex., and Gainsville, 37 miles.

The order for the eastern lines includes several installations of low-voltage switch machines, with the necessary interlocking signals; and on the Gulf lines this arrangement will be installed at two locations. The order includes 531 style T-2 semaphore signals and 47 style R color light signals, with the necessary relays, transformers and other apparatus.

# Supply Trade

The Magnetic Signal Company, Los Angeles, Cal., has moved its general office and plant to 3355 East Slauson avenue.

The Harold E. Trent Company, Philadelphia, Pa., has removed to larger quarters at 439-443 North Twelfth street, Philadelphia.

E. S. Wortham, sales agent of the Scullin Steel Company, with headquarters at Chicago, has been promoted to vice-president, with the same headquarters.

Edward C. Singler assistant secretary of the Maple Flooring Manufacturers' Association, has been appointed secretary to succeed George W. Keen, who resigned.

W. A. Maxwell, Jr., has been appointed to the newly created position of production manager of the Colorado Fuel & Iron Company, Denver, Colo., effective May 1.

W. H. Norton, representative of the Link-Belt Company, Chicago, has been appointed manager of the sales office opened at 229 Brown-Max building, Birmingham, Ala.

The Huey & Philip Hardware Company, Dallas, Tex., has been appointed exclusive agent in Texas and Oklahoma of the Chambersburg Engineering Company, Chambersburg, Pa.

The National Railway Appliances Association has moved its offices, including those of C. W. Kelly, secretary and treasurer, to the Oliver building, 1014 South Michigan avenue, Chicago.

W. W. Fitzpatrick, general sales manager of the Rawls Manufacturing Company, Chicago, has resigned to become representative of the Nordberg Manufacturing Company, Milwaukee, Wis.

William G. Zanglein has been appointed sales production manager of the Monroe Calculating Machine Company, Inc., Orange, N. J., Mr. Zanglein will devote his attention specifically to sales production and promotion problems.

R. C. Violett, formerly division engineer of the Denver & Rio Grande Western, with headquarters at Pueblo, Colo., has been appointed representative of the American Fork & Hoe Company, with headquarters at 520 East Fourteenth avenue, Denver, Colo.

J. J. Hennessy, for 12 years engineer with the Texas Company, with head-quarters at St. Louis and at New York, and for the past three years superintendent of its railway sales division at New York, has resigned to go into other railway sales work, with headquarters at New York.

Henry Gardner, formerly supervisor of material conservation, corporate mechanical engineer, and finally special engineer on the staff of the chief of motive power and equipment of the Baltimore & Ohio, has resigned to become consulting engineer with the Steamotor Company, Chicago.

H. K. Williams, for the past several years commercial engineer in the north-eastern district sales office of the Safety Car Heating & Lighting Company, with headquarters at New York, has been appointed sales engineer, with the same headquarters, reporting to the vice-president in charge of sales.

The Foote Bros. Gear & Machine Company, Chicago, has appointed the following district representatives: The Interstate Machine & Supply Company, Omaha, Neb.; W. L. Hutcheson, Oklahoma City, Okla.; the Nashville Machine & Supply Company, Nashville, Tenn.; and Hollis & Co., Little Rock, Ark.

The Ramapo Ajax Corporation has established the Racor Pacific Frog & Switch Works at 3355 East Slauson avenue, Los Angeles, Cal., and has opened a plant which will manufacture the same products that are being produced at the other plants of this company.

John R. Hayward, Liberty Trust building, Roanoke, Va., on April 1 will succeed Frank N. Grigg of Washington, D. C., as southeastern railway sales manager of the Heywood-Wakefield Company, Wakefield, Mass. Mr. Grigg has represented the Heywood-Wakefield Company for many years and is now retiring on account of his health.

F. A. Weymouth, formerly sales metallurgist of the Bethlehem Steel Company, has been elected vice-president of the Burden Iron Company, with headquarters at Troy, N. Y. Mr. Weymouth graduated from the Lawrence Scientific School, Harvard University, in 1906, and for several years served as engineer of tests of the Maryland Steel Company.

H. W. Renick, Pacific coast representative of the Ramapo Ajax Corporation, with headquarters at Los Angeles, Cal., has been elected vice-president in charge of the newly opened Los Angeles plant known as the Racor Pacific Frog & Switch Works. W. P. Janicki, formerly assistant chief engineer of the Chicago works, has been appointed districts engineer and superintendent at Los Angeles.

George J. Whelan, founder of the United Cigar Stores Company, and associates have recently secured about 55 per cent of the \$12,410,800 of outstanding \$100 par common stock of the Pressed Steel Car Company. The same interests are interested also in the Universal Pipe & Radiator Company. Mr. Whelan's purchase of common stock does not give him control of the Pressed Steel Car Company. In addition

to the common stock there is also outstanding \$14,814,100 of 7 per cent cumulative convertible preferred which has equal voting rights with the common stock.

J. M. Lorenz, vice-president and manager of railroad sales of the Central States General Electric Supply Company, Chicago, has resigned to become vice-president and director of sales of the Ralco Manufacturing Company, Chicago. Mr. Lorenz was born on January 14, 1865, at Ontario, Ohio, and graduated from the Northwestern Ohio Normal School in 1883. Subsequent thereto he was a salesman for the Western Publishing House and the Central School Supply House until 1892, when he entered the service of the purchasing and supply department of the Chicago



J. M. Lorenz

Telephone Company. He was later advanced to the position of chief clerk and assistant to the purchasing agent and storekeeper. In 1901 he became a salesman for the Central Electric Company, now the Central States General Electric Supply Company, serving as city and railroad salesman and manager of the Okonite and Ralco departments. In June, 1925, he was promoted to vice-president and manager of railroad sales.

### **Bucyrus Company**

The annual report of the Bucyrus Company, South Milwaukee, Wis., as of December 31, 1926, shows net earnings amounting to \$1,503,966 after deducting taxes and all other charges. Throughout the year regular quarterly dividends on the preferred stock were declared at the rate of 134 per cent. The quarterly declarations of dividends on the common stock amounted during the year to 12 per cent. The dividends on the \$3,900,000 of preferred stock and \$4,000,000 of common stock amounted to \$273,000 and \$480,000 respectively. At the November meeting of the directors, \$40,000 was appropriated to the special surplus account for the retirement of the preferred stock. Assets amounted to \$16,-644,039, of which land, buildings, machinery patterns, patents, etc., constituted \$8,388,-937, while the inventories amounted to \$4,787,946.

# Ryan Car Company

The annual report of the Ryan Car Company as of December 31, 1926, shows a loss of \$124,037 as compared with \$85,573 in the previous year. Gross sales amounted to \$1,402,639, as compared with \$4,024,242 in 1925. Assets amounted to \$2,888,594 as compared with \$2,787,037. During the year \$292,110 was spent for the development of new products. The capital stock authorized and outstanding consists of \$2,500,000 of which \$2,000,000, or 88,000 shares, are common stock with a par value of \$25 and \$500,000 are 5,000 shares of preferred with a par value of \$100. The operating statement follows:

Gross sales Cost of manufacture	1926 \$1,402,639	1925 \$4,024,242
(excluding depre- ciation)	1,486,254	4,074,370
Loss before depre- ciation Depreciation charged off.	\$83,615 79,907	\$50,128 81,924
Discounts, interest,	\$163,522	\$132,052
credits	- 39,485	46,479
Loss for the year	\$124,037	\$85,573
Dividends		140,000
Total loss for the year	\$124,037	\$225,573

"Foreseeing an extended lean period in the railroad repair business, your management took occasion, commencing early in 1925, to look about for some manufacturing line which would utilize the north plant of the company and which would, if possible, be in a field not so closely identified with or so promptly affected by the fluctuations in railway policy or railway prosperity. Two products were found which your directors approved. One of these, a steamdriven passenger car for railway use, is now being developed with the International Harvester Company, with whom we have an agreement which would preserve their rights in the power plant for bus and tractor purposes and secure for this company the rights for railroad purposes. This self-propelled car, the Locomotor, still requires some further development before it can be placed upon the market. The other item approved and acquired by your directors is a new type of machine for constructing and grading highways.

### Inland Steel Company

The annual report of the Inland Steel Company and subsidiaries for the year ended December 31, 1926, shows net profits of \$7,147,704 as compared with \$4,869,734 for the previous year after interest, taxes, depreciation and contributions to the employees' fund. This is equivalent after preferred dividends to \$5.45 a share earned on the 1,182,799 shares of no par value common stock outstanding as compared with \$3.52 a share during 1925. amount carried to surplus in 1926 was \$2,289,502 as compared with \$1,212,737 in the previous year. Assets and liabilities amounted to \$87,102,837 as compared with \$84,498,926. Capital assets were \$54,051,-608, current assets \$28,427,887, and deferred charges \$1,290,595. Capital stock amounted to \$45,000,000, the funded debt \$12,525,000, current liabilities \$4,805,078

and operating and contingent reserves \$2,-653,023. The surplus amounted to \$22,119,735. The consolidated income and surplus account for the year ending December 31, 1926, follows.

	1926	1925
Net earnings after de- ducting all expenses in- cident to operations, including charges for repairs and maintenance Other income (interest received)		
	\$11,180,782	\$7,998,458
Less: Provision for depreciation of plants Provision for exhaustion of minerals Bond interest Estimated federal taxes.	1,996,187 84,724 703,166 892,000	143,834
Estimated federal taxes	\$3,676,078	\$2.872.724
		44,000
Deduct:	\$7,504,704	\$5,125,734
Contributions to Employees' Savings and Profit Sharing Pension Fund	357,000	256,000
Net profits for the year	\$7,147,704	\$4,869,734
Surplus December 31, 1925	\$19,830,233	\$18,617,496
ties dismantled or abandoned	1,201,205	*******
	\$18,629,028	\$18,617,496
	\$25,776,732	\$23,487,230
Deduct:		
Dividends paid or declared: On preferred stock. On common stock	700,000 2,956,997	700,000 2,956,997
	\$3,656,997	\$3,656,997
Surplus December 31, 1926, as per balance sheet	\$22,119,735	\$19,830,233

# Obituary

Irving Williams, representative of William Sellers & Co. Inc., Philadelphia, Pa., died on March 11, at his home in Harrisburg, Pa., following an illness of two months' duration. Williams was graduated as a mechanical engineer at the Massachusetts Institute of Technology in 1903. He entered the employ of the Pennsylvania Railroad as special apprentice at the Altoona shops, and was later promoted to various positions including motive power inspector, assistant storekeeper, enginehoue foreman and assistant master mechanic. In 1925, he became associated with the injector department of William Sellers & Co. Inc.

Charles F. McCuen vice-president and sales manager of W. H. Miner, Inc., who died on February 26, in Pittsburgh, Pa., was born on September 27, 1870, in Pittsburgh. After finishing his school and university courses, he entered the service of the Atlanta & West Point, at Montgomery. Ala. In 1899 he was appointed chief clerk in the motive power department of the St. Louis Southwestern at Pine Bluff, Ark., and in 1905 resigned to become chief clerk to the superintendent of motive power of the Missouri Pacific. In 1911, he entered the

employ of the Standard Heat & Ventilation Company, now the Vapor Car Heating Company, and later was a representative of the Bradford Corporation and the Camel Company. In January, 1925, he was elected vice-president and sales manager of W. H. Miner, Inc., Chicago, which position he held until his death.

Jules H. Burwell, railroad supplies, 2038 Grand Central Terminal, New York City, died at his home in New York on March 16, at the age of 81 years. Mr. Burwell was active up to the day of his death. He was born in Franklin, Ohio, and in his earlier years was one of the firm of Mast, Bu-



J. H. Burwell

ford & Burwell, manufacturers of farm implements at Fargo, Ill. He came East in 1890, and opened an office selling railroad supplies. Up to the time of his death, Mr. Burwell represented the Pilliod Company, Swanton, Ohio; the Q. & C. Company, New York, and the Graham-White Sander Corporation, Roanoke, Va.

William O. Winston, chairman of the board of Winston Bros. Company, and president of the Winston Dear Company, Minneapolis, Minn., who died in Los Angeles, Cal., on March 15, was born on February 6, 1853, in Hanover county, Va., and was educated at Hanover Academy. He and two brothers organized Winston Bros., a construction company, in 1875. After the death of one brother in 1901, the business was incorporated as Winston Bros. Company and Mr. Winston was appointed vice-president, which position he held until 1914, when he was elected president. He held this position until 1921 when he was made chairman of the board of directors. In 1903 the Winston Dear Company was organized as a subsidiary for the purpose of engaging in stripping operations for the mines of the Missabe range in northern Minnesota. Mr. Winston has been president of this company for nearly the entire period of its existence. He was also a leading factor in the organization of the Association of General Contractors of America and was president in 1921.

# Construction

Baltimore & Ohio.—A contract has been awarded to the Ogle Construction Co. of Chicago, Ill., for the construction of a 600-ton four-track electrically operated reinforced concrete coaling station at Ohio Junction, Ohio. This will include the construction of two 3-track electrically operated cinder handling units and a 2500-ton reinforced concrete sand.

CHESAPEAKE & OHIO.—A contract has been awarded to the Railroad Water & Coal Handling Company, Chicago, for the construction of water treating plants and pumping stations on the Chesapeake & Hocking at Ruble, Ohio, and Circleville.

CHICAGO & NORTH WESTERN.—A contract has been let to Roberts Brothers, Chicago, for the grading in connection with the construction of extensions from Nisland, S. D., 12 miles, and from Belle Fourche, S. D., 4 miles. These projects will involve the excavation of about 225,000 cu. yd. of earth.

CHICAGO, BURLINGTON & QUINCY.—A contract for the construction of a one-story cement block pattern storage building, 80 ft. by 80 ft., at West Burlington, Ia., estimated to cost about \$15,000, has been let to the Zitterell Mills Company, Webster City, Ia.

CHICAGO, ROCK ISLAND & PACIFIC—A contract has been let to the Austin Bridge Company, Dallas, Tex., for the construction of a temporary pile trestle 2,000 ft. long across the Canadian River at a point six miles north of Fritch, Tex. This trestle will carry the new line now under construction north of Amarillo, Tex., over the Canadian river until a permanent steel bridge is constructed.

CLEVELAND, CINCINNATI, CHICAGO & St. Louis.—This road has let a contract to the Ogle Construction Company for the construction of a 500-ton four-track electrically operated reinforced concrete coaling station at Riverside, O.

DELAWARE, LACKAWANNA & WESTERN—A contract has been awarded to the Arthur McMullen Company, New York, for the construction of third and fourth main tracks in the vicinity of Boonton, N. J., at a cost of about \$300,000.

DETROIT & IRONTON.—This company has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a branch line extension as a relocation of the line of the Toledo-Detroit between Petersburg Junction, Mich., and Toledo, Ohio.

KANSAS CITY, MENICO & ORIENT.—A contract has been awarded to Terrazas & Matquia, Chihuahua City, Mex., for the construction of an extension from Las Norias, Chih., northward to the crossing of the Rio Grande river, near Presidio del Norte, Chih., 49 miles. Surveys have been completed for the construction of the line

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between Presidio del Norte and Alpine, Tex., about 100 miles.

MISSOURI-KANSAS-TEXAS.—This company has awarded a contract for the replacement of the superstructures of steel bridges at Boughner, Mo., and Rocheport, and at Crowder, Okla., and Elk City, with through riveted truss spans designed for Cooper's E-60 loading to the Mt. Vernon Bridge Company, Mt. Vernon, Ohio, at a cost of about \$80,000. A contract for the construction of a reinforced concrete underpass at Tushka, Okla., has been let to T. H. Johnson, Sedalia, Mo.

OREGON-WASHINGTON RAILROAD & NAV-IGATION COMPANY.—This company has included in its budget for 1927 the proposed expenditure of \$85,000 for the construction of a mill for boring, adzing, incising and stamping new ties at the tie treating plant at The Dalles, Ore. Landing facilities will be constructed at Astoria, Ore., and Megler, Wash., to accommodate the operation of a ferry-boat crossing the Columbia river between these points. An additional telephone circuit to provide better communication facilities between Portland, Ore., and Seattle, will be installed at a cost of about \$50,000. Approximately \$275,000 will be expended for the construction of miscellaneous roadway buildings.

Southern.—Bids close on March 29 for the construction of reinforced concrete coaling stations at Monroe, Va., 1000 tons capacity; Columbia, S. C., 1000 tons capacity; Bull Gap, Tenn., 375 tons and 225 tons capacity; Atlanta Junction, Ga., 800 tons capacity; Coster, Tenn., 500 tons capacity; Sheffield, Ala., 500 tons capacity; for the construction of concrete and steel coaling stations of 200 tons and 300 tons capacity at Anniston, Ala., and for the construction of steel coaling stations at Lawrenceville, Va., 300 tons capacity; Winston-Salem, N. C., 300 tons; Jacksonville, Fla., 300 tons.

SOUTHERN PACIFIC.—Plans of this company call for the construction of a locomotive repair shop at Eugene, Ore., at a cost of about \$220,000. Additional trackage, live stock pens, stores buildings and incidental structures at the same point will involve an estimated expenditure of \$250,000.

TENNESSEE & NORTHERN.—This road has been authorized to construct an extension of its railroad from Summit in a general southerly direction to the port of Mobile, a distance of approximately 30 miles, in Washington and Mobile counties, Alabama. The cost of constructing the extension on the new route is estimated at \$813,352, not including interest during construction.

Virginian. — A contract has been awarded to Morris, Gray and Hunter of Roanoke. Va., for the construction of a sub-grade for a passing track extension on the Norfolk division, which it is estimated will cost around \$35,000.

Western Pacific.—This company has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a branch line from Kingdon station to Terminus, San Joaquin county, Calif., 7.5 miles.

# Railway Finance

Baltimore & Ohio.—Abandonment of Branch.—The Interstate Commerce Commission has authorized this company to abandon 1.021 miles of branch line extending from a point east of Wellston, Ohio to Wainwright Mine.

Equipment Trusts Authorized.—The Interstate Commerce Commission has authorized an issue of \$9,750,000 41/2 per cent equipment trust certificates, series E, to be sold to a group consisting of the Bankers Trust Company, Brown Brothers & Co., Kissell, Kinnicutt Company, Evans, Stillman Company, and Harrison, Smith & Co., at 98.69 per cent of par, giving an average annual cost to the railroad of 4.685 per cent. The equipment includes 20 locomotives, 4.500 freight cars and 100 passenger train cars, having a total approximate cost of \$13,-930.477. The railroad sent an invitation for bids on this issue to 27 banking firms and ten bids were received representing 37 banks and bankers.

BALTIMORE & OHIO.—Equipment Trust Issue.-The Bankers Trust Company and associates were successful bidders with a price of 98.69 for an issue of \$9,750,000, 4½ per cent equipment trust certificates. Associated with the Bankers Trust Company were Brown Brothers & Co.; Evans, Stillman & Co.; Kissel, Kinnicut & Co., and Harrison, Smith & Co. Other bidders, individually or in groups, included Lee, Higginson & Co.; Halsey, Stuart & Co., Inc.; the Mercantile Trust Company, Baltimore; Kountze Bros.; Freeman & Co.; Chase Securities Corporation; Illinois Merchants Trust Company; Stone & Webster; Blodget & Co.; First National Corporation of Boston; Kean, Taylor & Co.; Rutter & Co., Equitable Trust Company; William R. Compton Company; Graham, Parson & Co.; International Acceptance Bank; Baltimore Trust Company; Mellon National Bank; Peoples Savings & Trust Company of Pittsburgh, and First National Bank of Pittsburgh.

Boston & Maine.—Annual Report.— Annual report for 1926 shows net after interest and other charges of \$6,405,078, an increase of \$1,092,404 over 1925. During the year the road paid \$3,926,319 in dividends, including 18 months dividends on all first preferred stocks and 4 months dividend on full paid prior preference stock outstanding. No dividends prepaid in 1925. Selected items from the income statement follow:

### Boston & Maine

Mileage operated at end	1926	or decrease
of year	2,083	-166
nues\$8	1,625,375	-\$3,388
Maintenance of way\$10	0,998,090	\$756,403
ment 1	5,189,191 2,148,846	-704,800 -708,991
Total operating expenses.\$6.	2,355,456 76.39	-\$632,007 -0.77

Net revenue from opera- tions	\$628,620 —108,834
Railway operating income.\$16,177,840	\$743,063
Equipment rents and jt. fac. rents, Dr 3,336,737	309,775
Net railway operating in- come\$12,841,103 Non-operating income 1,876,049	\$433,288 888,738
Gross income\$14,717,153 Rent for leased roads 1,139,132 Interest on funded debt 6,887,080	\$1,322,026 —90,219 287,843
Net income \$6,405,079	\$1,092,404
Disposition of net income— Dividends	\$3,926,319 —716,200
Surplus for year carried to profit and loss \$2,478,759	-\$2,117,715

CHESAPEAKE & OHIO-Objection to Interrention of Minority-This company has filed with the Interstate Commerce Commission an objection to the petitions of minority stockholders of the company for leave to intervene and be treated as parties to the proceedings on the applications for authority to acquire control of the Erie and Pere Marquette and to issue additional common stock. The objection is based on the ground that the petitions "do not set forth any facts sufficient to warrant said petitioners intervening" and the commission is asked to deny them and strike them from the record. The commission had already granted the petitions for leave to intervene. C. C. McChord, formerly a member of the commission, appears in the list of counsel for the C. & O.

CHICAGO, BURLINGTON & QUINCY.—
Bonds Authorized.—The Interstate Commerce Commission has authorized this company to issue for pledge \$18,294,000 of general mortgage 4 per cent bonds and to issue \$30,000,000 of first and refunding mortgage 4½ per cent bonds, series B, including \$1,706,000 of such bonds heretofore authorized to be authenticated and delivered. The bonds are to be sold at not less than 94

be sold at not less than 94.

Bonds Sold.—J. P. Morgan & Co., the First National Bank and the National City Company have sold \$30,000,000 first and refunding mortgage 4½ per cent bonds at 97 and interest giving a yield of 4.65 per cent to maturity. The bonds mature February 1, 1977, and are redeemable, at the option of the company, as an entirety but not in part, on or after February 1, 1952, or on any interest date thereafter prior to February 1, 1967, at 105 per cent and accrued interest; on February 1, 1967, or on any interest date thereafter prior to maturity, at 103 per cent and accrued interest.

Delaware, Lackawanna & Western.— Distribution of Bond Holdings to Stockholders.—The Lackawanna announced on Wednesday that the directors had authorized the distribution to stockholders of \$92,600,000 par value bonds of the Glen Alden Coal Company and of railroad subsidiaries now held in the company's treasury. The bonds are as follows: The distribution will be effected by the formation of a new company named the Lackawanna Securities Company which will hold the securities and the stock of which, totaling 844,411 shares without par value, will be distributed to Delaware, Lackawanna & Western stockholders in the ratio of one share of new stock to two shares of railroad stock. The official statement of the management said:

"The board directed the formation of the Lackawanna Securities Company, the transfer to it of \$9,871,000 Morris & Essex 3½ per cent bonds, due 2000, and \$58,500,000 of 4 per cent Glen Alden bonds, payable \$1,500,000 per year; also, upon approval by the Interstate Commerce Commission, of \$10,000,000 Morris & Essex 5 per cent bonds, due 1955, and \$13,635,000 New York, Lackawanna & Western 5 per cent bonds, due 1973. These are all treasury assets of the company, but it cannot dispose of the latter two items without the approval of the commission. "The stock of the new company, constituting

"The stock of the new company, constituting 844,411 no par value shares, will be distributed to the stockholders of the Delaware, Lackawanna & Western Railroad Company on the basis of one share of new stock for two shares of the railroad company stock."

DULUTH, SOUTH SHORE & ATLANTIC— Abandonment—This comapny has applied to the Interstate Commerce Commission for authority for the abandonment of its Bessemer branch, from Bessemer to Bessemer Junction, Mich., 2.3 miles.

GULF & Interstate of Texas.—Bonds Authorized.—The Interstate Commerce Commission has authorized this company to issue general mortgage 6 per cent series A bonds totaling \$1,529,000 to be delivered to the Atchison, Topeka & Santa Fe, the parent company in payment for advances. Commissioner Eastman dissented, saying:

Commissioner Eastman dissented, saying:

This applicant with only \$71,000 of stock outstanding desires to issue \$1,529,000 of 6 per cent mortgage bonds. It has not in the past had earnings sufficient to pay the interest upon a debt of this amount. If it were an independent company I think it may safely be assumed that we would not, under such circumstances, authorize an issue of mortgage bonds such as is sought. Such justification as exists for the issue lies in the fact that this company is a part of the Santa Fe system and that its obligations will be protected by the system. The difficulty with subsidiary companies of this character is that for certain purposes we are asked to regard them as separate entities while for other purposes it is desired that we consider them inseparable parts of a system. It does not seem to me that we should permit them to build up financial structures which would be wholly unsound if their present technical separate existence should at some future time become actual. In this instance applicant should issue stock to the Santa Fe rather than additional mortgage bonds.

GULF, COLORADO & SANTA FE.—Lease.— The Interstate Commerce Commission has authorized a renewal of the lease of the Gulf, Beaumont & Kansas City for a period of 10 years from January 1, 1927.

GULF, Mobile & Northern.—Acquisition.—This company has applied to the Interstate Commerce Commission for authority to acquire control of the Birmingham & Northwestern by purchase of 2,090 shares of a total of 3,000 shares of that company for \$5,000 and the payment of a rental of \$40,000 a year. The line extends from Jackson, Tenn., to Dyersburg, 53 miles. The Gulf, Mobile & Northern acquired all the funded debt and an option on the majority of the capital stock of the B. & N. W. in 1924 and 1925.

Hocking Valley.—Annual Report.— Annual report for 1926 shows net income after interest and other charges of \$2,746,459, equivalent to \$24.96 a share on the capital stock. Net income in 1925 was \$2,072,206, or \$18.79. Selected items from the income statement follow:

# Hocking Valley

Ry, operating revenues	1926 \$19,550,258	1925 \$19,659,712
Maintenance of way	\$2,389,905	\$2,478,769
Maintenance of equip.	5,030,627	5,380,978
Transportation	5,717,221	5,815,393
Total operating expenses	\$13,826,111	\$14,309,397
Operating ratio	70.7	72.8
Net rev. from operations	\$5,724,147	\$5,350,315
Railway tax accruals	1,331,760	1,220,004
Ry. operating income	\$4,391,815	\$4,128,776
Equipment rents—Dr	240,338	579,938
Joint facility rents—Cr.	45,558	70,374
Net ry. oper. income	\$4,197,035	\$3,619,213
Non-operating income.	247,432	290,494
Gross income	\$4,444,467 1,634,490	\$3.909,707 1,785,717
Total deductions from Gross income	\$1,698,008	\$1,837,501
Net income	\$2,746,459	\$2,072,206
Dividends	\$1,319,940	\$439,980

International-Great Northern — Equipment Trust Certificates—This company has applied to the Interstate Commerce Commission for authority for an issue of \$1,755,000 of equipment trust certificates, to be sold to Freeman & Co., the highest bidders, at 98.533.

Kansas City, Mexico & Orient,—
Court Orders Change in Reorganization
Plan.—The reorganization approved by
the District Court of Kansas, after it was
sold under foreclosure on March 27,
1924, was, on March 23, ordered modified
by the United States Circuit Court of
Appeals to permit the owners of \$5,640,200
of gold notes to purchase stock issued to
Clifford Histed and associates under the
reorganization plan.

Under the reorganization plan, Clifford Histed and associates purchased the property for \$3,000,000. The plan called for the authorization of \$7,500,000 capital stock of which \$3,500,000 was to be delivered to Histed and \$4,000,000 to be offered to the owners of the two-year 6 per cent notes for subscription at \$80 per share.

Owners of the notes, which are held by American and British interests including the Trustees Corporation, Ltd., of London; Sir George Alexander Touche of England, American Car & Foundry Company, American Locomotive Company and P. S. Woods, appealed to the higher court to set aside the sale on the ground that the minimum price of \$3,000,000 was inadequate and subsequent reorganization was not fair to them.

Under the court's decision the noteholders may purchase within four months 35,000 shares of stock at \$62.50 a share, which is held by Clifford Histed and associates, who purchased the road, and W. T. Kemper of Kansas City, former receiver of the system.

If the note-holders do not accept this offer, the Appellate Court makes a second proposition of permitting them to purchase within 30 days 40,000 shares of unissued or treasury stock of the railroad.

New Orleans, Texas & Mexico-Equipment Trust Certificates—This company has applied to the Interstate Commerce Commission for authority for an issue of \$930,000 of equipment trust certificates, to be sold to Freeman & Co., the highest bidders, at 98.666.

NEW YORK, NEW HAVEN & HARTFORD .-Authorized to Acquire Central New Eng. land .- The Interstate Commerce Commission has issued a certificate authorizing this company to acquire and operate the lines of the Central New England and to acquire the line of the Harlem River & Port Chester, and to assume obligation and liability in respect of securities of the Central New England. The report says that the facts of record show that the proposed acquisition of the physical properties of the Central and the Port Chester "would result in numerous economies, would facilitate the financing of those properties, and is desirable for many other reasons. It is further shown that the Central and the Port Chester constitute the principal western termini of the applicant; that they are essentially terminal companies and could not possibly be operated successfully as independent carriers, and that they are now and have for many years been integral parts of the applicant's system." It is also stated that It is also stated that the applicant's system originally included about 165 companies and that through acquisition from time to time this number has been reduced to 10, of which the Central and the Port Chester are the only subsidiaries in which the applicant owns 100 per cent of the stock. "This simplification of the applicant's corporate structure" is said to be "clearly in the public interest." The certificate is granted on the condition that the New Haven shall have secured an order under paragraph 2 of section 5 of the interstate commerce act authorizing it to acquire control by lease of the Hartford & Connecticut Western, which is operated by lease by the Central New England, and that the New Haven shall charge out of its investment in road and equipment account the sum of \$6,840,044 representing the net difference between the par and book values of the Central securities owned by it. Commissioner Eastman dissented, saying that in his judgment what is here proposed is a "consolidation which cannot lawfully be accomplished without our approval under the provisions of paragraph 6 of section 5."

Norfolk & Western.—New Director.— Thomas S. Southgate of Norfolk, Va., has been elected a director, succeeding F. S. Royster, resigned.

PENNSYLVANIA.—Owns 45 Per Cent of Norfolk & Western.—The Pennsylvania is reported to have purchased about \$18,000,000 of Norfolk & Western common stock during 1926, bringing its holdings in the stock of that company up to 45 per cent of the total.

SEABOARD AIR LINE,—Bonds,—The Interstate Commerce Commission has

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authorized this company to issue \$5,000,000 of first and consolidated mortgage 6 per cent bonds, to be sold at not less than 96½ and to sell \$2,000,000 of Seaboard-All Florida first mortgage 6 per cent bonds at not less than 951/2. The Interstate Commerce Commission has also authorized an issue of refunding mortgage bonds in an amount which, when taken at the time of pledge, will not exceed \$3,202,146, to be pledged under the first and consolidated mortgage. The company has also been authorized to issue \$3,378,500 of first and consolidated mortgage bonds. to be pledged as security for short-term

WABASH .- Equipment Trusts .- Freeman & Co. have purchased a new issue of \$2,625,000 of Wabash 4½ per cent certificates, Series G. These are to be dated April 1, 1927, and will mature in fifteen annual instalments from April 1, 1928, to 1042 both inclusive.

WESTERN MARYLAND.—Annual Meeting.—The Baltimore & Ohio which recently acquired a 35 per cent interest in the stock of the Western Maryland did not vote its stock at the annual meeting of the company held at Baltimore on March 16. The failure of the Baltimore & Ohio to vote its stock, President M. C. Byers of the Western Maryland said, might have been due to the inability of the former to complete its arrangements before the books closed for the annual meeting.

President Byers also said that it was probable that traffic and trackage arrangements of mutual interest to both companies might be worked out in the near future. No changes were contemplated in the economic policy of the Western Maryland, he added. All retiring mem-bers of the board of directors were reelected and two new members were added, namely, John M. Dennis of Baltimore and Lee Crouch of Elkins, W. Va.

### Dividends Declared

Kansas City Southern.—Preferred, 1 per cent, quarterly, payable April 15 to holders of record March 31.

Midland Valley.—Common, 2½ per cent, semi-annually, payable April 15 to holders of record March 31.

# Average Price of Stocks and Bonds

Average price of 20 repre	Mar. 22	Last week	Last
sentative railway stocks Average price of 20 repre	. 106.55	106.63	90.08
sentative railway bonds		00.01	05 67

# Valuation Reports

The Interstate Commerce Commission has issued final or tentative valuation reports finding the final value for rate-making purposes of the property owned and used for common-carrier purposes as follows:

### Final Penorte

That repor	La	
Bauxite & Northern Georgia, Florida & Alabama Wyandotte Terminal	2,783,000	1918 1917 1918

- onenerve rech		
Tylerdale Connecting Trans-Mississippi Terminal Chicago & Calumet Piver	\$127,500 2,055,000	1917 1916

# Railway Officers

# Executive

- P. M. Atkins, president of the Monroe Hardware Company, Monroe, La., and a director of the Arkansas, Louisiana & Missouri, has been elected vice-president of the latter company, with headquarters at Monroe.
- R. C. Watkins, vice-president and general manager of the Louisiana Lines of the Southern Pacific, has been elected vice-president and appointed statutory agent in Louisiana for the Southern Pacific Lines in Louisiana and Texas (the Texas & New Orleans), with headquarters at New Orleans, La.

# Financial, Legal and Accounting

- C. R. Ross has been appointed supervisor of regional expenditures of the Central region of the Pennsylvania.
- St. D. J. DeBlanc, treasurer of the Louisiana Lines of the Southern Pacific, has been elected assistant secretary and assistant treasurer of the Southern Pacific Lines in Texas and Louisiana (the Texas & New Orleans), with headquarters at New Orleans, La.

Frank J. Fell, Jr., deputy comptroller of the Pennsylvania, with headquarters at Philadelphia, Pa., has been appointed comptroller, with the same headquarters, succeeding E. A. Stockton, deceased. Elmer Hart, chief special agent in the accounting department, has been advanced to the newly created position of assistant to comptroller. George W. Rush, division freight agent, at Wilmington, Del., has become assistant freight claim agent at Philadelphia, succeeding J. H. Baer, deceased. This latter appointment is effective April 1.

William T. Faricy, general attorney for the Hauser Construction Company, Long Beach, Cal., has been appointed general attorney of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn. Mr. Faricy was born on March 7, 1893, at St. Paul and graduated from the St. Paul College of Law in 1914. During the World War, from 1917 to 1919, he served as a captain of infantry in the American Expeditionary Force in France, participating in the Meuse-Argonne offensive. His connection with railway service began on November 1, 1920, in the legal department of the Omaha, advancing through various positions to that of commerce attorney of the parent company, the Chicago & North Western, in 1924. In 1925 Mr. Faricy left railroad service to become general attorney for the Hauser Construction Company and affiliated companies at Long Beach, Cal., a position he held until his appointment as general attorney of the

# Operating

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- George M. Smith, superintendent of the Baltimore division of the Pennsylvania, with headquarters at Baltimore, Md., has been advanced to the newly created position of general agent and superintendent at Baltimore, effective April 1. In this capacity, Mr. Smith, in addition to performing the operating duties of superintendent, will be vested with general supervision over the company's interests in Baltimore and the promotion of its good will and public relations throughout the entire state of
- J. C. Rill, freight trainmaster of the Middle division of the Pennsylvania, has been appointed superintendent of the Logansport division, with headquarters at Logansport, Ind., succeeding B. H. Hudson, promoted. F. W. Stoops, freight trainmaster of the Panhandle division, has become freight trainmaster of the Middle division, and J. C. Dennis, assistant trainmaster of the Pittsburgh division, has become freight trainmaster of the Panhandle division. All appointments are effective April 1.
- J. F. Sugrue, superintendent of the Lake Charles & Northern, has been appointed assistant superintendent of the Southern Pacific Lines in Texas and Louisiana (the Texas & New Orleans), with headquarters at DeRidder, La. C. D. Kemper, general manager of the Franklin & Abbeville, has been appointed assistant suerintendent of the Southern Pacific Lines in Texas and Louisiana (Texas & New Orleans), with headquarters at Franklin, La. E. V. Chauvin has been appointed trainmaster, with headquarters at Lafayette, La.
- A. C. Shields, assistant general manager of the Denver & Rio Grande Western, at Denver, Colo., has been promoted to general manager, with headquarters at the same point, effective April 1, succeeding I. H. Luke, who will retire on that date after completing 50 years of railroad service. L. F. Wilson, general superintendent of transportation, has been appointed assistant general manager in charge of all matters concerning the conducting of transportation, with headquarters at Denver. R. E. Ray, general supervisor of wages and working agreements has been appointed assistant general manager in charge of wages and working agreements, with headquarters at Den-

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Carl L. Sauls, who has been appointed superintendent of the Seaboard Air Line, with headquarters at Arcadia, Fla., was born on April 25, 1887, at Garner, N. C. He was graduated from Garner High School in 1903, and attended Elon College in 1903-04. In December, 1904, he entered railroad service as an operator and relief agent on the North Carolina division of the Seaboard Air Line. In 1906 he became a clerk in the office of the chief dispatcher at Raleigh, N. C., and the following year was promoted to dispatcher at Hamlet, N. C. In 1913 he was promoted to assistant chief dis-



C. L. Sauls

patcher, and in the following year to chief dispatcher. In 1917 he became trainmaster. Two years later he was transferred in a similar capacity to Abbeville, S. C., and in 1921 was again transferred to Hamlet, N. C. In 1925 he was appointed assistant superintendent at Tampa, Fla., and the following year was transferred to Arcadia, Fla., as assistant superintendent and trainmaster. A few months later he became assistant superintendent of the South Florida division, with the same

headquarters, which position he held at the time of his recent promotion.

Robert H. Allison, who has been promoted to general manager of the Western lines of the Atchison, Topeka & Santa Fe, with headquarters at Amarillo, Tex., was born on August 8, 1871, at Glad Spring, Va., and entered railway service when 16 years old as a warehouseman on the Norfolk & Western. In 1891 Mr. Allison was promoted to dispatcher, becoming dispatcher on Chicago & Alton in February, 1898. Later in the same year he took a similar position on the Chicago & North Western and in April, 1899, he was advanced to chief train dispatcher. His service with the Santa Fe began in January, 1902, as a trick dispatcher and the following year he was promoted to chief train dispatcher. In 1905 Mr. Allison was again promoted to trainmaster Chillicothe, Ill., and from 1914 to 1920 he served as superintendent at



Robert H. Allison

Marcelline, Mo., and Chillicothe. He was then promoted to assistant general manager of the Eastern district, with headquarters at Topeka, Kan., a position he held until his further advancement to general manager of the Western lines. Fred C. Fox, who at his own request has relinquished the position of general manager of the Western lines and has been appointed assistant to the vice-president, has completed 47 years in the service of the Santa Fe. He was born on October 9, 1863, at Marysville, Ohio, and entered railway service at the age of 16 as a telegraph operator on the Cleveland, Columbus, Cincinnati & Indianapolis (consolidated as the Cleveland, Cincinnati, Chicago & St. Louis). On July 4, 1881, he became a telegraph operator on the Santa Fe, advancing successively during the period until September, 1889, to freight and ticket agent and trick dispatcher. Mr. Fox was then promoted to chief train dispatcher, becoming trainmaster in 1892 and superintendent in 1900, in which position he served at Las Vegas, N. M., and Newton, Kan. In 1905, he was promoted to general superintendent of the East Grand division, with headquarters at

Topeka, where he remained until 1910; when he was promoted to general manager of the Western lines and vice-president of the Pecos & Northern Texas, the Southern Kansas of Texas and the Panhandle & Santa Fe (now



F. C. Fox

parts and subsidiaries of the Santa Fe). Mr. Fox was appointed general manager of the Eastern lines, with headquarters at Topeka, in 1916, a position he will hold until his appointment as assistant to the vice-president becomes effective on April 1.

# Traffic

E. A. Grodes, general agent on the Chicago, Rock Island & Pacific, has been promoted to assistant general freight agent, with headquarters at Chicago.

Captain C. E. McCullough, Jr., assistant general passenger agent of the Pennsylvania, with headquarters at Washington, D. C., has been advanced to the newly created position of general passenger agent, with the same headquarters.

William C. Douglas, who has been appointed freight traffic manager of the Michigan Central, with headquarters at Chicago, was born on February 2, 1880, at Chicago and entered railway service with that company on September 1, 1896. He served in various capacities in the general freight department of this company until November, 1917, when he was promoted to division freight agent at Detroit, Mich. In September, 1919, Mr. Douglas was appointed assistant general freight agent, with headquarters at Chicago, becoming assistant freight traffic manager at the same point in September, 1924. He remained as assistant freight traffic manager at Chicago until his further promotion to freight traffic manager on February 1.

V. P. Sumerfield, assistant general freight agent of the Pennsylvania, with headquarters at Philadelphia, has been appointed general freight agent at Philadelphia. This new agency is additional to the one already located there. W. H. H. Willis, division freight agent at

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Philadelphia, has been advanced to the newly created position of assistant to the freight traffic manager, with the same headquarters. S. T. Stackpole, assistant general freight agent at Detroit, Mich., has been appointed general freight agent, a newly created position at Detroit. W. W. Finley, Jr., general southeastern freight agent at Atlanta, Ga., has been appointed to the newly created position of general freight agent at Cincinnati, Ohio. W. B. Hopkins, assistant general freight agent of the Long Island at New York, has been advanced to assistant general freight agent of the Pennsylvania at Philadel-An additional assistant general freight agent is also authorized at Philadelphia, and Edmund Funck, now commerce assistant, office of the assistant freight traffic manager, has been appointed to it. E. B. Hankey, division freight agent at Pittsburgh, has been advanced to the position of the division freight agent at Philadelphia, succeeding Mr. Willis. G. A. Sargent, chief clerk to the traffic manager at Pittsburgh, has become division freight agent in that city, succeeding Mr. Hankey. L. S. Weber, district freight agent at Easton, Pa., has become division freight agent at Wilmington, Del. V. C. Kline, office manager in the general freight department at Philadelphia, has become divi-sion freight agent at Harrisburg, succeeding Gilbert H. Cobb, who will retire under the pension regulations at the end of the present month. M. H. Mac-Quown, division freight agent at Altoona, Pa., has been transferred to Uniontown, Pa., in the same capacity. W. P. Veit, chief clerk to the general foreign freight agent in Philadelphia, has been advanced to the position of division freight agent at Altoona, succeeding Mr. MacQuown. These promotions are all effective April 1.

# Mechanical

George A. Silva, general inspector of locomotive maintenance of the Boston & Maine, with headquarters at Boston, Mass., has been appointed superintendent of shops, with headquarters at North Billerica, Mass., succeeding Harold L. Leighton, who has been assigned to other duties. James S. Clarke has been appointed general inspector of locomotive maintenance, with headquarters at Boston, succeeding Mr. Silva.

G. W. McGowan, shop superintendent on the Texas lines of the Southern Pacific at Houston, Tex., has been appointed master mechanic of the Houston terminals, including jurisdiction over the Englewood car department. J. T. Connor, master mechanic of the Houston division, with headquarters at San Antonio, Tex., has been appointed shop superintendent at Houston, succeeding Mr. McGowan. F. L. Carson, assistant superintendent of motive power, with headquarters at Yoakum, Tex., has been transferred to San Antonio with supervision over the shops at that point and all mechanical matters on the Houston division.

Marvin E. Wilcox, who has been appointed assistant superintendent of car maintenance of the Boston & Maine, with headquarters at Boston, Mass. was born on July 26, 1898, at Buffalo, N. Y., and was educated in the Buffalo, N. Y., the Cleveland, Ohio, and the Hammond, Ind., public schools. He en-



M. E. Wilcox

tered railway service in 1912, with the Chicago, Indiana & Southern and the Indiana Harbor Belt (jointly), both of which are now parts of the New York Central. He began work as a car repairer for the Indiana Harbor Belt and remained with that company until the time of his recent appointment. He was advanced to shop assistant foreman and finally to foreman of car inspectors.

Henry H. Urbach, assistant superintendent of motive power of the lines of the Chicago, Burlington & Quincy east of the Missouri river with headquarters at Chicago, has been promoted to superintendent of motive power of the Lines west of the Missouri river, with headquarters at Lincoln, Neb., succeeding O. E. Ward, transferred to the Lines East of the Missouri river, with headquarters at Chicago. Mr. Ward replaces J. W. Cyr, who has been appointed superintendent of shops at Aurora, Ill., succeeding J. A. Carney appointed acting superintendent of safety, with headquarters at Chicago, in place of D. E. Hahn, granted a leave of absence on account of ill health.

J. A. Brossart, who has been appointed general master car builder of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Indianapolis, Ind., succeeding I. S. Downing, deceased, entered the service of the Big Four in May, 1903, as an inspector at Brightwood, Ind., being advanced to piecework inspector on September 1, 1905, and to general shop inspector on December 1, 1910. With the opening of the Beech Grove shops of the Big Four in August, 1913, he was promoted to freight car foreman in which position he remained until April 1, 1914, when he was again promoted to general passenger car foreman at the same point. On March 1,

1925, Mr. Brossart was promoted to superintendent of car shops at Beech Grove, a position he held until his further promotion to general master car builder.

# Engineering, Maintenance of Way and Signaling

W. R. Pearson, chief land appraiser on valuation work on the Louisville & Nashville at Louisville, Ky., has been appointed valuation engineer, with the same headquarters. Mr. Pearson en-



W. R. Pearson

tered the service of the L. & N. in October, 1902, as a rodman, advancing successively to chainman, draftsman, topographer and instrumentman. 1906 he was promoted to locating engineer and after a year out of railroad service during 1909 he returned to the & N. as assistant engineer in the office of the chief engineer of construction. During the World War Mr. Pearson served as a captain of engineers with the American Expeditionary Force and at the end of the war he was commissioned as a major in the Engineer Reserve Corps. In October, 1920, he was appointed chief land appraiser on valuation work, acting under the office of the real estate agent, a position he held until his promotion to valuation

# Purchases and Stores

V. J. Crow has been appointed division storekeeper of the Southern, with headquarters at Columbia, S. C., succeeding J. B. Lowd, resigned. R. A. Livengood, division storekeeper at Charlotte, N. C., has been appointed storekeeper, Charlottee roadway shop, with headquarters at the same place, succeeding J. H. Logan, transferred.

# Special

C. W. Watts has been appointed superintendent of claim prevention of the Missouri - Kansas - Texas Lines, with headquarters at Denison, Tex.

bonds 58,500,000

Morris & Essex 5s of 1955 10,000,000

New York, Lackawanna & Western 5s of 1973 13,635,000

The distribution will be effected by the formation of a new company named the Lackawanna Securities Company which will hold the securities and the stock of which, totaling 844,411 shares without par value, will be distributed to Delaware, Lackawanna & Western stockholders in the ratio of one share of new stock to two shares of railroad stock. The official statement of the management said:

"The board directed the formation of the Lackawanna Securities Company, the transfer to it of \$9.871.000 Morris & Essex 3½ per cent bonds, due 2000, and \$\$8.500.000 of 4 per cent Glen Alden bonds, payable \$1,500,000 per year; also, upon approval by the Interstate Commerce Commission, of \$10.000,000 Morris & Essex 5 per cent bonds, due 1955, and \$13,635.000 New York, Lackawanna & Western 5 per cent bonds, due 1973. These are all treasury assets of the company, but it cannot dispose of the latter two items without the approval of the commission. "The stock of the zew company, constituting 844,411 no par value shares, will be distributed to the stockholders of the Delaware, Lackawanna & Western Railroad Company on the basis of one share of new stock for two shares of the railroad company stock."

DULUTH, SOUTH SHORE & ATLANTIC-Abandonment-This comapny has applied to the Interstate Commerce Commission for authority for the abandonment of its Bessemer branch, from Bessemer to Bessemer Junction, Mich., 2.3 miles.

GULF & INTERSTATE OF TEXAS .- Bonds Authorized.-The Interstate Commerce Commission has authorized this company to issue general mortgage 6 per cent series A bonds totaling \$1,529,000 to be delivered to the Atchison, Topeka & Santa Fe, the parent company in payment for advances. Commissioner Eastman dissented, saying:

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This applicant with only \$71,000 of stock outstanding desires to issue \$1,529,000 of 6 percent mortgage bonds. It has not in the past had earnings sufficient to pay the interest upon a debt of this amount. If it were an independent company I think it may safely be assumed that we would not, under uch circumstances, authorize an issue of mortgage bonds such as is sought. Such justification as exists for the issue lies in the fact that this company is a part of the Santa Fe system and that its obligations will be protected by the system. The afficulty with subsidiary companies of this character is that for certain purposes we are asked to regard them as separate entities while for other purposes it is desired that we consider them inseparable parts of a system. It does not seem to me that we should permit them to build up financial structures which would be wholly unsound if their present technical separate existence should at some future time become actual. In this instance applicant should issue stock to the Santa Fe rather than additional mortgage bonds.

GULF. COLORADO & SANTA FE .- Lease .-The Interstate Commerce Commission has authorized a renewal of the lease of the Gulf, Beaumont & Kansas City for a period of 10 years from January 1, 1927.

GULF, MOBILE & NORTHERN.-Acquisition. This company has applied to the Interstate Commerce Commission for authority to acquire control of the Birmingham & Northwestern by purchase of 2,090 shares of a total of 3,000 shares of that company for \$5,000 and the payment of a rental of \$40,000 a year. The line extends from Jackson, Tenn., to Dyersburg, 53 miles. The Gulf, Mobile & Northern acquired all the funded debt and an option on the majority of the capital stock of the B. & N. W. in 1924 and 1925.

HOCKING VALLEY .--Annual Report .-Annual report for 1926 shows net income after interest and other charges of \$2,746, 459, equivalent to \$24.96 a share on the capital stock. Net income in 1925 was \$2,072,206, or \$18.79. Selected items from the income statement follow:

### Hocking Valley

Ry. operating revenues	1926 \$19,550,258	1925 \$19,659,712
Maintenance of way	\$2,389,905	\$2,478,769
Maintenance of equip.	5,030,627	5,380,978
Transportation	5,717,221	5,815,393
Total operating expenses	\$13,826,111	\$14,309,397
Operating ratio	70.7	72.8
Net rev. from operations	\$5,724,147	\$5,350,315
Railway tax accruals	1,331,760	1,220,004
Ry. operating income	\$4,391,815	\$4,128,776
Equipment rents—Dr	240,338	579,938
Joint facility rents—Cr.	45,558	70,374
Net ry. oper. income	\$4,197,035	\$3,619,213
Non-operating income.	247,432	290,494
Gross income	\$4,444,467 1,634,490	\$3,909,707 1,785,717
Total deductions from Gross income	\$1,698,008	\$1,837,501
Net income	\$2,746,459	\$2,072,206
Dividends	\$1,319,940	\$439,980

INTERNATIONAL-GREAT NORTHERN Equipment Trust Certificates-This company has applied to the Interstate Commerce Commission for authority for an issue of \$1,755,000 of equipment trust certificates, to be sold to Freeman & Co., the highest bidders, at 98.533.

KANSAS CITY, MEXICO & ORIENT.— Court Orders Change in Reorganisation Plan.—The reorganization approved by the District Court of Kansas, after it was sold under foreclosure on March 27, 1924, was, on March 23, ordered modified by the United States Circuit Court of Appeals to permit the owners of \$5,640,200 of gold notes to purchase stock issued to Clifford Histed and associates under the reorganization plan.

Under the reorganization plan, Clifford Histed and associates purchased the property for \$3,000,000. The plan called for the authorization of \$7,500,000 capital stock of which \$3,500,000 was to be delivered to Histed and \$4,000,000 to be offered to the owners of the two-year 6 per cent notes for subscription at \$80 per share.

Owners of the notes, which are held by American and British interests including the Trustees Corporation, Ltd., of London; Sir George Alexander Touche of Eng-land, American Car & Foundry Company, American Locomotive Company and P. S. Woods, appealed to the higher court to set aside the sale on the ground that the minimum price of \$3,000,000 was inadequate and subsequent reorganization was not fair to them.

Under the court's decision the noteholders may purchase within four months 35,000 shares of stock at \$62.50 a share, which is held by Clifford Histed and associates, who purchased the road, and W. T. Kemper of Kansas City, former receiver of the system.

If the note-holders do not accept this offer, the Appellate Court makes a second proposition of permitting them to purchase within 30 days 40,000 shares of unissued or treasury stock of the railroad.

NEW ORLEANS, TEXAS & Equipment Trust Certificates-This company has applied to the Interstate Commerce Commission for authority for an issue of \$930,000 of equipment trust certificates, to be sold to Freeman & Co., the highest bidders, at 98.666.

NEW YORK, NEW HAVEN & HARTFORD.-Authorized to Acquire Central New England .- The Interstate Commerce Commission has issued a certificate authorizing this company to acquire and operate the lines of the Central New England and to acquire the line of the Harlem River & Port Chester, and to assume obligation and liability in respect of securities of the Central New England. The report says that the facts of record show that the proposed acquisition of the physical properties of the Central and the Port Chester "would result in numerous economies, would facilitate the financing of those properties, and is desirable for many other It is further shown that the Central and the Port Chester constitute the principal western termini of the applicant; that they are essentially terminal companies and could not possibly be operated successfully as independent carriers, and that they are now and have for many years been integral parts of the applicant's system." It is also stated that the applicant's system originally included about 165 companies and that through acquisition from time to time this number has been reduced to 10, of which the Central and the Port Chester are the only subsidiaries in which the applicant owns 100 per cent of the stock. "This simplification of the applicant's corporate structure" is said to be "clearly in the public interest." The certificate is granted on The certificate is granted on the condition that the New Haven shall have secured an order under paragraph 2 of section 5 of the interstate commerce act authorizing it to acquire control by lease of the Hartford & Connecticut Western, which is operated by lease by the Central New England, and that the New Haven shall charge out of its investment in road and equipment account the sum of \$6,840,044 representing the net difference between the par and book values of the Central securities owned by it. Commissioner Eastman dissented, saying that in his judgment what is here proposed is a "consolidation which cannot lawfully be accomplished without our approval under the provisions of paragraph 6 of section 5,"

NORFOLK & WESTERN .- New Director .-Thomas S. Southgate of Norfolk, Va., has been elected a director, succeeding F. S. Royster, resigned.

PENNSYLVANIA .- Owns 45 Per Cent of Norfolk & Western.—The Pennsylvania is reported to have purchased about \$18,000,-000 of Norfolk & Western common stock during 1926, bringing its holdings in the stock of that company up to 45 per cent of the total.

SEABOARD AIR LINE .- Bonds .- The Interstate Commerce Commission

this company authorized \$5,000,000 of first and consolidated mortgage 6 per cent bonds, to be sold at not than 961/2 and to sell \$2,000,000 of Seaboard-All Florida first mortgage 6 per cent bonds at not less than 951/2. The Interstate Commerce Commission has also authorized an issue of refunding mortgage bonds in an amount which, when taken at the time of pledge, will not exceed \$3,202,146, to be pledged under the first and consolidated mortgage. The company has also been authorized to issue \$3,378,500 of first and consolidated mortgage bonds, to be pledged as security for short-term notes.

WABASH .- Equipment Trusts .- Freeman & Co. have purchased a new issue of \$2,625,000 of Wabash 4½ per cent certificates, Series G. These are to be dated April 1, 1927, and will mature in fifteen annual instalments from April 1, 1928, to 1942, both inclusive.

WESTERN MARYLAND. - Annual Meeting.-The Baltimore & Ohio which recently acquired a 35 per cent interest in the stock of the Western Maryland did not vote its stock at the annual meeting of the company held at Baltimore on March 16. The failure of the Baltimore & Ohio to vote its stock, President M. C. Byers of the Western Maryland said, might have been due to the inability of the former to complete its arrangements before the books closed for the annual meeting.

President Byers also said that it was probable that traffic and trackage arrangements of mutual interest to both companies might be worked out in the near future. No changes were contemplated in the economic policy of the Western Maryland, he added. All retiring mem-bers of the board of directors were reelected and two new members were added, namely, John M. Dennis of Baltimore and Lee Crouch of Elkins, W. Va.

# Dividends Declared

Kansas City Southern.—Preferred, 1 per cent, quarterly, payable April 15 to holders of record March 31.

Midland Valley.—Common, 2½ per cent, semi-annually, payable April 15 to holders of record March 31.

# Average Price of Stocks and Bonds

0			
Average price of 20 repre-	Mar. 22	Last week	Last
sentative railway stocks.  Average price of 20 repre-		106.63	90.08
sentative railway banda	22 00	99.01	05 67

# Valuation Reports

The Interstate Commerce Commission has issued final or tentative valuation reports finding the final value for rate-making purposes of the property owned and used for common-carrier purposes as fol-

### Final Reports

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### Tentative Penorte

Tenentia Tech	07.00	
Tylerdale Connecting	2.055,000	1917 1916 1919

# Railway Officers

# Executive

P. M. Atkins, president of the Monroe Hardware Company, Monroe, La., and a director of the Arkansas, Louisiana & Missouri, has been elected vice-president of the latter company, with headquarters at Monroe.

R. C. Watkins, vice-president and general manager of the Louisiana Lines of the Southern Pacific, has been elected vice-president and appointed statutory agent in Louisiana for the Southern Pacific Lines in Louisiana and Texas (the Texas & New Orleans), with headquarters at New Orleans, La.

# Financial, Legal and Accounting

C. R. Ross has been appointed supervisor of regional expenditures of the Central region of the Pennsylvania.

St. D. J. DeBlanc, treasurer of the Louisiana Lines of the Southern Pacific, has been elected assistant secretary and assistant treasurer of the Southern Pacific Lines in Texas and Louisiana (the Texas & New Orleans), with headquarters at New Orleans, La.

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C. L. Sauls

patcher, and in the following year to chief dispatcher. In 1917 he became Two years later he was trainmaster. transferred in a similar capacity to Abbeville, S. C., and in 1921 was again transferred to Hamlet, N. C. In 1925 he was appointed assistant superintendent at Tampa, Fla., and the following year was transferred to Arcadia, Fla., as assistant superintendent and train-master. A few months later he be-came assistant superintendent of the South Florida division, with the same

the time of his recent promotion.

Robert H. Allison, who has been promoted to general manager of the Western lines of the Atchison, Topeka & Santa Fe, with headquarters at Amarillo, Tex., was born on August 8, 1871, at Glad Spring, Va., and entered railway service when 16 years old as a warehouseman on the Norfolk & Western. In 1891 Mr. Allison was promoted to dispatcher, becoming dispatcher on Chicago & Alton in February, 1898. Later in the same year he took a similar position on the Chicago & North Western and in April, 1899, he was advanced to chief train dispatcher. His service with the Santa Fe began in January, 1902, as a trick dispatcher and the following year he was promoted to chief train dispatcher. In 1905 Mr. Allison was again promoted to trainmaster at Chillicothe, Ill., and from 1914 to 1920 he served as superintendent at



Robert H. Allison

Marcelline, Mo., and Chillicothe. He was then promoted to assistant general manager of the Eastern district, with headquarters at Topeka, Kan., a position he held until his further advancement to general manager of the Western lines. Fred C. Fox, who at his own request has relinquished the position of general manager of the Western lines and has been appointed assistant to the vice-president, has completed 47 years in the service of the Santa Fe. He was born on October 9, 1863, at Marysville, Ohio, and entered railway service at the age of 16 as a telegraph operator on the Cleveland, Columbus, Cincinnati & Indianapolis (consolidated as the Cleveland, Cincinnati, Chicago & St. Louis). On July 4, 1881, he became a telegraph operator on the Santa Fe, advancing successively during the period until September, 1889, to freight and ticket agent and trick dispatcher. Mr. Fox was then promoted to chief train dispatcher, becoming trainmaster in 1892 and superintendent in 1900, in which position, he served at Las Vegas, N. M., and Newton, Kan. In 1905, he was promoted to general superintendent of the East Grand division, with headquarters at

Topeka, where he remained until 1910, when he was promoted to general man-ager of the Western lines and vicepresident of the Pecos & Northern Texas, the Southern Kansas of Texas and the Panhandle & Santa Fe (now



F. C. Fox

parts and subsidiaries of the Santa Fe). Mr. Fox was appointed general manager of the Eastern lines, with headquarters at Topeka, in 1916, a position he will hold until his appointment as assistant to the vice-president becomes effective on April 1.

# Traffic

E. A. Grodes, general agent on the Chicago, Rock Island & Pacific, has been promoted to assistant general freight agent, with headquarters at Chicago.

Captain C. E. McCullough, Jr., assistant general passenger agent of the Pennsylvania, with headquarters at Washington, D. C., has been advanced to the newly created position of general passenger agent, with the same headquarters.

William C. Douglas, who has been . appointed freight traffic manager of the Michigan Central, with headquarters at Chicago, was born on February 2, 1880, at Chicago and entered railway service with that company on September 1, He served in various capacities in the general freight department of this company until November, 1917, when he was promoted to division freight agent at Detroit, Mich. In September, 1919, Mr. Douglas was appointed assistant general freight agent, with headquarters at Chicago, becoming assistant freight traffic manager at the same point in September, 1924. He remained as assistant freight traffic manager at Chicago until his further promotion to freight traffic manager on February 1.

V. P. Sumerfield, assistant general freight agent of the Pennsylvania, with headquarters at Philadelphia, has been appointed general freight agent at Phila-delphia. This new agency is additional to the one already located there. W. H. H. Willis, division freight agent at

Philadelphia, has been advanced to the newly created position of assistant to the freight traffic manager, with the same headquarters. S. T. Stackpole, assistant general freight agent at Detroit, Mich., has been appointed general freight agent, a newly created position at Detroit. W. W. Finley, Jr., general southeastern freight agent at Atlanta, Ga., has been appointed to the newly created position of general freight agent at Cincinnati, Ohio. W. B. Hopkins, assistant general freight agent of the Long Island at New York, has been advanced to assistant general freight agent of the Pennsylvania at Philadel-An additional assistant general phia. freight agent is also authorized at Philadelphia, and Edmund Funck, now commerce assistant, office of the assistant freight traffic manager, has been appointed to it. E. B. Hankey, division freight agent at Pittsburgh, has been advanced to the position of the division freight agent at Philadelphia, succeeding Mr. Willis. G. A. Sargent, chief clerk to the traffic manager at Pittsburgh, has become division freight agent in that city, succeeding Mr. Hankey. L. S. Weber, district freight agent at Easton, Pa., has become division freight agent at Wilmington, Del. V. C. Kline, office manager in the general freight department at Philadelphia, has become division freight agent at Harrisburg, succeeding Gilbert H. Cobb, who will retire under the pension regulations at the end of the present month. M. H. Macdivision freight agent at Al-Quown, toona, Pa., has been transferred to Uniontown, Pa., in the same capacity. W. P. Veit, chief clerk to the general foreign freight agent in Philadelphia, has been advanced to the position of division freight agent at Altoona, succeeding Mr. MacQuown. These promotions are all effective April 1.

# Mechanical

George A. Silva, general inspector of locomotive maintenance of the Boston & Maine, with headquarters at Boston, Mass., has been appointed superintendent of shops, with headquarters at North Billerica, Mass., succeeding Harold L. Leighton, who has been assigned to other duties. James S. Clarke has been appointed general inspector of locomotive maintenance, with headquarters at Boston, succeeding Mr. Silva.

G. W. McGowan, shop superintendent on the Texas lines of the Southern Pacific at Houston, Tex., has been appointed master mechanic of the Houston terminals, including jurisdiction over the Englewood car department. J. T. Connor, master mechanic of the Houston division, with headquarters at San Antonio, Tex., has been appointed shop superintendent at Houston, succeeding Mr. McGowan. F. L. Carson, assistant superintendent of motive power, with headquarters at Yoakum, Tex., has been transferred to San Antonio with supervision over the shops at that point and all mechanical matters on the Houston division.

Marvin E. Wilcox, who has been appointed assistant superintendent of car maintenance of the Boston & Maine, with headquarters at Boston, Mass. was born on July 26, 1898, at Buffalo, N. Y., and was educated in the Buffalo, N. Y., the Cleveland, Ohio, and the Hammond, Ind., public schools. He en-



M. E. Wilcon

tered railway service in 1912, with the Chicago, Indiana & Southern and the Indiana Harbor Belt (jointly), both of which are now parts of the New York Central. He began work as a car repairer for the Indiana Harbor Belt and remained with that company until the time of his recent appointment. He was advanced to shop assistant foreman and finally to foreman of car inspectors.

Henry H. Urbach, assistant superintendent of motive power of the lines of the Chicago, Burlington & Quincy east of the Missouri river with headquarters at Chicago, has been promoted to superintendent of motive power of the Lines west of the Missouri river, with headquarters at Lincoln, Neb., succeeding O. E. Ward, transferred to the Lines East of the Missouri river, with headquarters at Chicago. Mr. Ward replaces J. W. Cyr, who has been appointed superintendent of shops at Aurora, Ill., succeeding J. A. Carney appointed acting superintendent of safety, with headquarters at Chicago, in place of D. E. Hahn, granted a leave of absence on account of ill health.

J. A. Brossart, who has been appointed general master car builder of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Indianapolis, Ind., succeeding I. S. Downing, deceased, entered the service of the Big Four in 1903, as an inspector at Brightwood, Ind., being advanced to piecework inspector on September 1, 1905, and to general shop inspector on December 1, 1910. With the opening of the Beech Grove shops of the Big Four in August, 1913, he was promoted to freight car foreman in which position he remained until April 1, 1914, when he was again promoted to general passenger car foreman at the same point. On March 1,

1925, Mr. Brossart was promoted to superintendent of car shops at Beech Grove, a position he held until his further promotion to general master car builder.

# Engineering, Maintenance of Way and Signaling

W. R. Pearson, chief land appraiser on valuation work on the Louisville & Nashville at Louisville, Ky., has been appointed valuation engineer, with the same headquarters. Mr. Pearson en-



W. R. Pearson

tered the service of the L. & N. in October, 1902, as a rodman, advancing successively to chainman, draftsman, topographer and instrumentman. In 1906 he was promoted to locating engineer and after a year out of railroad service during 1909 he returned to the L. & N. as assistant engineer in the office of the chief engineer of construction. During the World War Mr. Pearson served as a captain of engineers with the American Expeditionary Force and at the end of the war he was commissioned as a major in the Engineer Reserve Corps. In October, 1920, he was appointed chief land appraiser on valuation work, acting under the office of the real estate agent, a position he held until his promotion to valuation engineer.

# Purchases and Stores

V. J. Crow has been appointed division storekeeper of the Southern, with headquarters at Columbia, S. C., succeeding J. B. Lowd, resigned. R. A. Livengood, division storekeeper at Charlotte, N. C., has been appointed storekeeper, Charlottee roadway shop, with headquarters at the same place, succeeding J. H. Logan, transferred.

# Special

C. W. Watts has been appointed superintendent of claim prevention of the Missouri - Kansas - Texas Lines, with headquarters at Denison, Tex.

# Obituary

Arthur E. Law, who retired as assistant general superintendent of the North-Pacific in 1905, died at his home ern in Minneapolis, Minn., on March 17. Mr. Law was born in 1845 and previous to 1890 was for several years assistant superintendent of the St. Paul, Little Falls and Dakota divisions of the Northern Pacific. In August, 1890 he was promoted to superintendent of the Minnesota division, with headquarters at Minneapolis, becoming acting gen-eral superintendent in June, 1900. Mr. Law was promoted to assistant general superintendent in October of the same year, with headquarters at Wash., a position he held until his retirement in April, 1905.

William K. Tasker, superintendent of the Port Huron-Grand Rapids division of the Pere Marquette from 1911 to 1914, and more recently traffic manager of the Detroit News, died of heart disease while driving his automobile, in Detroit, Mich., on February 17. Mr. Tasker was born in Milwaukee, Wis., in 1885 and entered the service of the Pere Marquette (then the Flint & Pere Marquette) at the age of 16. He advanced successively through various positions in the operating department of this company, to that of superintendent of telegraph lines in 1905. In 1911 he was promoted to division superintendent and in 1914 he again became superintendent of telegraph lines, resigning from railroad service in 1921 to become traffic manager of the Detroit News.

Joseph C. Rich, general solicitor of the Gulf, Mobile & Northern, who died at Mobile, Ala., on March 8, was born near Marion, Ala., on September 10. After finishing his public school education at State Line, Miss., he entered Vanderbilt University, and later received his law training at the University of Mississippi. Mr. Rich began the practice of law in Mobile in March, 1881, being elected a member of the city council in 1882, and serving in this capacity until his election as mayor of Mobile in 1888, which position he held until 1892. In 1902, Mr. Rich was elected to the state legislature, where he acted as chairman of the judiciary committee of the house, and previous to 1900 he served for a time as Mobile county attorney. In 1914 he was appointed attorney for the New Orleans, Mobile & Chicago, and in 1917, when the railroad was reorganized as the Gulf, Mobile & Northern, Mr. Rich was promoted to general solicitor, a position he held until his death.

Joseph P. O'Donnell, traffic manager of the Kansas City, Mexico & Orient of Texas from 1913 to 1915, died in February at San Antonio, Tex. Mr. O'Donnell was born on March 3, 1871, and entered railway service at the age of 17 as a messenger in the office of the superintendent of transportation of the Louisville & Nashville at Louisville, Ky. He then held various positions in the engineering department of the

L. & N., in the mechanical department of the Gulf, Colorado & Santa Fe, as receiver of the Gulf & Interstate (now a part of the Atchison, Topeka & Santa Fe), and in the operating department of the Colorado & Southern, becoming general freight and passenger agent of the Oklahoma Central (now a part of the Santa Fe) at Purcell, Okla., in 1908. After serving as traffic manager of the K. C., M. & O., of Texas, he entered the traffic department of the San Antonio, Uvalde & Gulf, leaving the position of general agent at Kansas City, Mo., in 1925 to accept service with the Southern Steamship Company of Dallas, Tex.

Samuel Moody, retired passenger traffic manager of the Pennsylvania, was found dead in his bed at his home in Beaver, Pa., on March 16. While he had not been in good health for a long time, his sudden death was unexpected. He was born on August 24, 1851, at Brooklyn, N. Y. Prior to entering the service of the Pennsylvania, he was engaged in mercantile business. On December 2, 1885, he was employ-



Samuel Moody

ed as a traveling ticket seller by the passenger department of the former Pennsylvania, Lines West of Pittsburgh. Two years later he was appointed district passenger agent at Pittsburgh. On February 1, 1893, he was appointed assistant general passenger agent at Cincinnati and two years later was transfered to the general offices at Pittsburgh in the same From 1904 until the early capacity. part of 1910, Colonel Moody was gen eral passenger agent of the Pennsylvania at Pittsburgh, and on the retirement of the late E. A. Ford, was appointed passenger traffic manager. This office he held until his retirement under the pension regulations of the company on June 30, 1918.

E. A. Stockton, comptroller of the Pennsylvania, died of heart disease at his home in Swarthmore, Pa., on March 5. Mr. Stockton was 67 years of age and had been in the service of the Pennsylvania since November 1, 1872. He was born in California, where he received his early education. On moving to Pennsylvania, he secured em-

ployment in the accounting department as a clerk in the office of the auditor passenger receipts. On October 1. 1882, he was transferred to the comptroller's office, where he advanced until he was placed in charge of the accountwork of the entire Pennsylvania Railroad System. He was appointed special agent on July 1, 1891, and was advanced to chief bookkeeper on April 1. 1893, and to chief accountant on January 1, 1896, and on November 1. 1899, became assistant auditor of disbursements. On March 1, 1905, Mr. Stockton became assistant to the comptroller, and deputy comptroller on June 1, 1910. When the United States Railroad Administration took over the operation of the railroads, Mr. Stockton was appointed general auditor of the Eastern lines of the Pennsylvania, effective July 1, 1918. Three months lathis title was changed to Federal auditor. On March 1, 1920, upon the termination of Federal control, he was appointed comptroller of the Pennsylvania System, which position he was holding at the time of his death.

George M. Brown, chief engineer of the Saginaw district of the Flint & Pere Marquette, and engineer of water service of its successor, the Pere Marquette, from 1898 to 1905, died on February 11 at his home at Detroit, Mich. Mr. Brown was born on March 1, 1843, in Rutland township, Tioga county, Pa., and after attending Wellsboro academy he served in the civil war in the Fifth Pennsylvania Volunteers. He was wounded in the seven-day battle before Richmond, Va., in 1862, entering railway service in the engineering department of the Flint & Pere Marquette upon his discharge from a government hospital in 1867. In 1869 he was promoted to resident engineer on the construction of the lines between Milford, Mich., and Northville and between Clare, Mich., and Averill, and after three years in this position he spent the next 19 years, to 1891, as general road-master. He then became superintendent of roadway and structures and from May, 1898, to January, 1900, he served as engineer in charge of bridges and buildings. Mr. Brown was next promoted to chief engineer of the Saginaw district of the Pere Marquette, with headquarters at Saginaw, Mich., becoming assistant engineer late in 1900 and acting as engineer of water service from 1902 to 1905. During the first part of the present century Mr. Brown devoted a large share of his attention to game conservation. He was largely instrumental in the establishment of state and federal fish hatcheries in Michigan and was appointed three successive times as president of the Michigan Fish Commission.

THE LONG ISLAND announces that since the first of February, 21 agencies at stations on its lines have been provided with Pullman tickets for points on ar beyond the Pennsylvania; and that there are now 55 passenger stations on Long Island where this accommodation is provided.



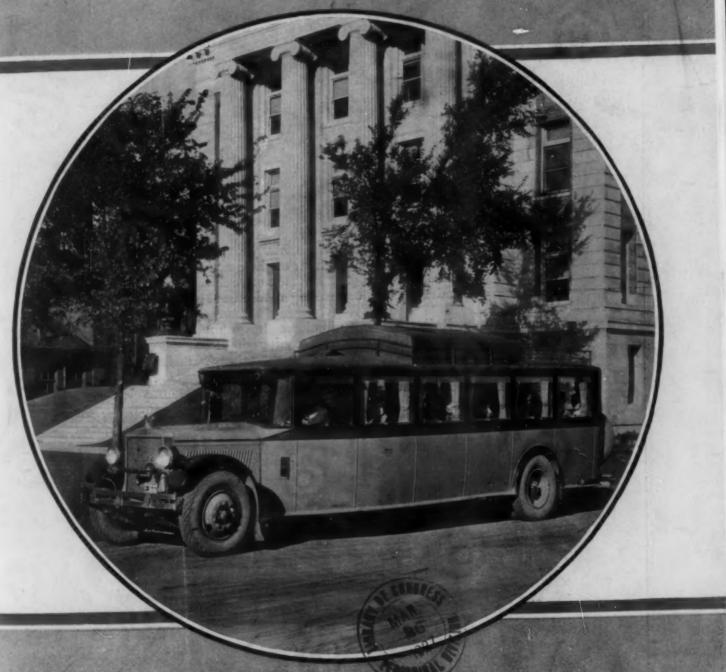


# Railway A See Motor Transport Section Devoted to the Co-ordination of Railway and Highway Service

FIRST HALF OF 1927-No. 17

NEW YORK-MARCH 26, 1927-CHICAGO

SEVENTY-SECOND YEAR



Articles in This Issue:

Pacific Electric Co-ordinates Rail and Bus Service
Card Index Makes Inspection Scheduling Easy
Four Garages Maintain North Shore Buses
B. & M. Finds Merit in Co-ordinated Highway Service



# Highway Service and the Railroad

MOTOR transport builders are turning their attention toward heavy, speedy, large capacity vehicles. The foremost of these have found the adoption of Westinghouse Automotive Air Brakes a decided advantage in controlling modern speed and power.

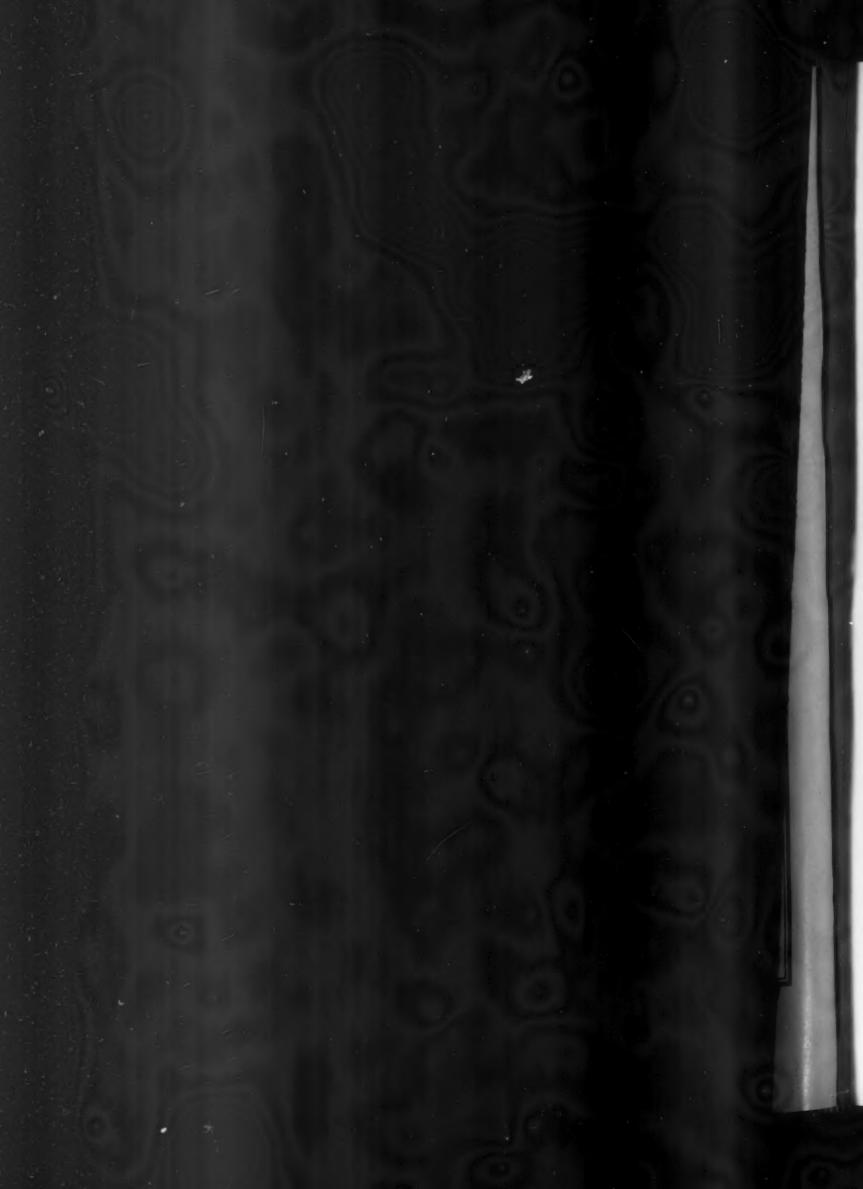
Railroad companies have shown more than a casual interest in vehicles so equipped. Their experience in transportation has taught the value of efficient retardation and the futility of carrying heavy loads at high speeds without it. Through this recognition, Westinghouse is enabled to serve the railroads in a new field with a time tested product—the Westinghouse Automotive Air Brake.

The illustrated A. C. F. heavy duty unit is serving in a fast freight capacity, coordinating with steam road service. It is equipped with Westinghouse Automotive Air Brakes. They are standard with A. G. F.

WESTINGHOUSE AIR BRAKE COMPANY Automotive Division, Wilmerding, Pa.

AUTOMOTIVE AIR BRAKES







Mack Buses in Service of Borderland Transportation Company, Operating Between California and Texas

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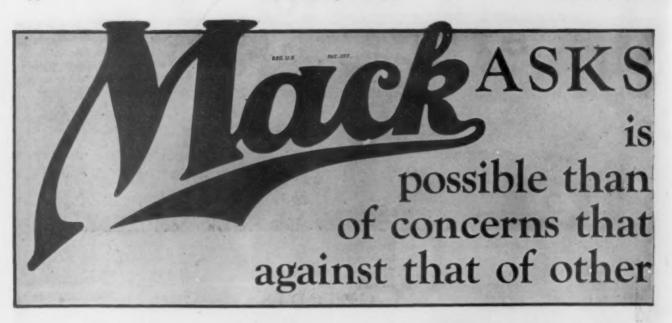
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America's Greatest Highway-Passenger-Carrying Organization adds

# 147

# MACK BUSES

to its Mack Fleet making a total of 247 Mack Units

The Public Service Corporation of New Jersey, in addition to placing direct orders for 78 Macks up to 1926, had been taking over groups of independent lines that were operating practically every known make of bus including 22 Macks. Their recent order for 147 brings their total Mack equipment up to 247 units.



Vol. 82, No. 10

March 26, 1927

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#### Extent of Railroad Truck Use Not Fully Appreciated

I T is probable that few persons fully appreciate the extent to which the railways are now using motor trucks for the transportation of freight, express and other traffic. The more important railway truck operations, such as those of the New York Central and the Pennsylvania, are familiar to many railway officers, but the operations on the highways of many other roads, while less striking and less generally known, probably approach the larger ones in magnitude in the aggregate. As a matter of fact, there is good reason to believe that at least a few railways do not fully appreciate what they themselves are doing along this line. As an illustration, the vice-president in charge of operation of a large eastern road recently sent to the division officers a questionnaire, designed to bring out a complete record of all the truck operations for the transportation of freight on his road. To his surprise, it was found that scarcely a division had not made one or more arrangements, either by contract or otherwise, whereby freight and other materials were being handled by motor truck. The fact that such arrangements had been made was known, of course, by the general officers, but the fact that motor trucks were being used so generally over the system had not been appreciated. Similar investigations on other roads might lead to similar surprises. is that the motor truck has already assumed an important place in the railroad traffic-handling organization.

# The Motor Bus in a Growing Community

THE bus system which has been established by the Pacific Electric in the metropolitan area in and near Los Angeles is an example of bus operation by a railroad in a densely populated suburban area in which the local conditions require an extension of the service at points where rail extensions could not be made to pay for a number of years, if at all, but where the buses are capable of giving as good and in some respects better service than would be possible by means of rail extensions. Furthermore, the metropolitan area which is being served is developing and increasing in population rapidly and probably will continue to do so for years to come. Rail extensions made with the best possible foresight today may be found to be poorly located from a revenue standpoint a few years hence, and other communities may spring up, so that the service, based on present conditions, would be wholly inadequate. But, as conditions

change, and they surely will in a community growing so rapidly, the bus system is so flexible that the transportation facilities which it supplies can be changed from time to time or increased to meet almost any need. At the same time the company avoids investments which cannot be made remunerative for some years and which might, in some instances, be permanently unprofitable. In the meantime, it is operating a facility at a small part of the cost that it would be necessary to assume if it extended its rails; if it is found desirable later to abandon any of the established routes, this can be done with practically no loss, a condition which is in sharp contrast to the loss which it would have to assume in the abandonment of a rail line.

#### Bus Terminals on Private Property

OPERATORS of inter-city buses or other lines covering relatively long distances, in distinction to the purely urban lines, are facing a growing demand on the part of the public in cities that they provide themselves with stations on private property. gestion in most of our cities is growing daily worse Naturally a vehicle as large as a bus which stands for considerable periods parked at the curb is looked upon with hostility. Particularly is this true where police regulations prohibit similiar parking by private vehicles. Apparently the bus terminal on private property which keeps the parked bus off of the street will soon be the rule. And it will come by the exercise of public authority-unless the bus operators are sufficiently alive to the situation to undertake this improvement on their own initiative. The man who senses the trend of public opinion and acts on it prior to a show of force is doubly wise. The improvement does not cost him any more, and possibly may cost him less, by reason of his being forehanded. Moreover, he gets a cash return from his investment by a friendly public reaction. If he is forced to make the improvement he spends the money just the same and gets nothing but harsh words for his pains. Railroads which have gone into the motor vehicle field have shown themselves wise in the activity they have manifested in this direction. But they must spare no effort to keep in the van. The independent operator who gives poor service or treats the public in a cavalier fashion stands only to lose his equity in his vehicles The railroad bus operator, on the other hand, realizes that the good name not only of the bus line but also of the whole railroad is at stake. It is worth going to some trouble to maintain.

#### Use of Trucks in Relieving Terminal Congestion

IT is a significant fact that a large part of the study of the Railroad Motor Transport Conference has been concerned with the use of motor trucks in congested terminals. This is significant because it indicates that the railroads are awake to the fact that terminal operation in the past has often been inefficient and expensive and that the motor truck represents a possible opportunity for betterment of this condition. Truck operation by the railways in their congested terminals is well established. The use of trucks by most of the railways entering New York, the trucking service rendered by contractors for all the lines entering St. Louis, Mo., and Cincinnati, Ohio, the tractor and trailer operation of the Rock Island between its downtown and suburban freight stations in Chicago and vicinity, and other similar cases, have been and are being made the subject of close study by the Motor Transport Conference and by the railroads individually. There are many jobs that the motor truck can do better than the locomotive and freight car. The railways are finding out what these jobs are, and in an increasing number of instances are putting motor trucks or tractors and trailers to work at

#### Insuring the Regularity of Inspections

PREVENTIVE maintenance is better than repair after failure, as all experienced bus and truck operators have found. The basis of preventive maintenance, furthermore, is regular, periodic inspection. Failures of parts of buses and trucks that could not have been predicted beforehand if those parts had been subjected to inspection by an expert mechanic are rare, which is fortunate because all bus and truck operators can afford to see that such inspection is carried out regularly. It is just as essential that inspections of parts be made regularly as it is that they should be made at all. Any means, therefore, by which the regularity of periodic inspec-tions can be insured will be worth adopting. The plan of the Northland Transportation Company, which utilizes a card index to make sure that no scheduled inspection is overlooked, is simple and effective. It is described in this issue of the Motor Transport Section, and is worth the study of all officers connected with the maintenance of bus and truck equipment. Other operating companies have other plans, some of which are similar to that of the Northland, while others differ in major respects. The decision as to which is the best will be made by each company individually, the only important matter being the necessity of a system of some sort by means of which the regularity of inspections, which enable the prevention of costly failures of parts, will be insured. parts of buses and trucks require more frequent attention than others. Experience alone will show what these intervals should be. Companies newly entering the field of bus and truck operation will probably find it to their advantage to adopt the conclusions of others more experienced in the business, at least until they have suffi-cient experience upon which to base conclusions of their own. But the paramount consideration, as experience of companies like the Northland has shown, is that there be regular inspections of bus and truck parts and that all elements of chance affecting the regularity of them be

#### Only the Finest Is Good Enough

SOME railways, in operating bus lines, do not have to compete with the buses of independent operators; others have to meet such competition. If these latter are to be successful in their fight for business they will do well to adhere to certain rules which, while unwritten, are nevertheless important, as experience has shown.

It is axiomatic that to win out over a competitor, one must provide everything that he provides and something more. Applying this to a railway bus operation competitive with an independent bus operator, the railway, to make a successful bid for the traffic, should offer as convenient or more convenient schedules, as courteous and efficient drivers and other employees who meet the public, and as fine or finer equipment. Given at least an equality in these things, railways will be at an advantage in the competition of their bus lines with those of independent operators because of the fact that their responsibility is better established and the public in general has more confidence in them. But there must be at least equality with respect to the other inducements to prospective passengers.

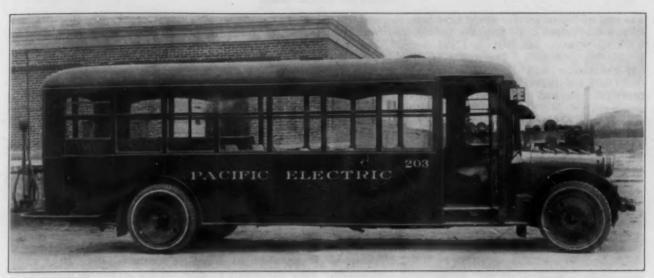
The matter of furnishing as luxurious equipment as their independent competitors has proved a troublesome one to some railways. It is not, of course, that they have been unable to afford the most completely equipped motor buses but rather that they have found it difficult to justify in their own minds the installation of such equipment. They have considered the parlor type of bus with its luxurious fittings wasteful in first cost as well as in maintenance. They have felt that buses fitted more plainly had the advantage of being less expensive to buy and to maintain, while offering quite as comfortable riding qualities for their passengers.

able riding qualities for their passengers.

No one will disagree that buses of the intercity type, for example, which are not as a rule equipped with window curtains and other such fittings are less expensive in first and later costs than parlor type buses which have such perhaps non-essential features and that they offer substantially as much riding comfort. The cost alone, however, is not the only consideration, for from this standpoint the ideal bus would probably be equipped with wooden benches or even castiron ones with other appointments or lack of them of a similarly barren nature.

Opposing the cost consideration, however, is that of traffic. Other things being equal, public patronage will be won by that bus line which operates the most luxurious buses. This has been proved to be the case even in mining regions where one might reasonably expect that passengers, such as miners or other laboring men, would be more than satisfied with something a little less luxurious than the so-called parlor type of bus.

The fact is that the public has been educated to the parlor type bus until it now demands it not as something special but as a matter of course. Independent operators in competitive territories almost without exception operate nothing but the most luxuriously equipped parlor type buses. The railways which operate buses will do well to recognize this, and to recognize also that inconsequential as the extra appointments of such buses may seem they are the sort of thing that attracts patronage. Plainer types of buses may be operated more cheaply than parlor types but in competition with the latter they will be handicapped to such an extent that the likelihood of their being able to make a successful bid for patronage will be greatly prejudiced. Most railway bus operators have found it advisable to overlook the cost of parlor type buses and to install, in spite of it, the kind of equipment that patrons prefer.



This Fageol Bus Seats 29 Passengers

# Pacific Electric Co-ordinates Rail and Bus Service

Railway organization handles operation and maintenance of 114 coaches which have replaced train service

Southern Pacific with 1,167 miles of electrified interurban rail lines in and about Los Angeles and a considerable intra-city mileage which functions as street car lines, has established a large system of motor bus routes to supplement and extend its rail operations. This was done primarily for feeder service but incidentally the operation of the buses was undertaken by the Pacific Electric to protect itself against unreasonable competition and because it realized its obligation to provide adequate transportation for the districts it serves. Outside of Los Angeles, where buses are operated in intra-city service, jointly with the Los Angeles Railways, this company has 114 buses in regular daily service, making 4,200,000 car miles annually and carrying nearly 1,000,000 passengers a month.

The Pacific Electric operates its bus lines through its regular railway organization. Bus drivers are qualified conductors and motormen and are worked off the same board with the motormen, conductors and extra men in the rail service. They are not required to report to the dispatcher as interurban trainmen are, but operate on their schedules, reporting only when off schedule and then to local supervisors who are on the ground. With the abandonment of the rail lines in Pasadena and the substitution of bus lines, the conductors and motormen were allowed to bid on any class of service for which they were qualified. In this manner the bus runs were filled by those who preferred to operate buses or who were unable, on account of their seniority, to secure runs on the rail lines.

The same system of discipline and the same rates of wages that are in effect on the one-man cars on the rail lines apply to the bus service and as most of the bus lines are short and the men can live on or near the bus routes many of them prefer to drive the buses rather than

to continue in the rail service. A separate organization to handle the bus service would not be practicable in this instance because the bus lines are at widely separated points in the metropolitan area, with numerous short routes that have no co-ordination with the remainder of the bus lines except through the rail system. Therefore, under the circumstances a separate organization to handle the buses would mean a duplication of the supervisory forces.

The rates of fare in effect on the buses are the same as those on the rail lines for equal distances. Through



Fast Trucks Carry Mechanics Who Make Emergency Repairs

rates are in effect with two stage lines out of Riverside, one out of Newport, and one out of Upland to points not accessible by Pacific Electric service.

#### Buses Substituted for Rail Service

In Pasadena the Pacific Electric had a number of local street car lines which were in poor physical condition and which would have required a large expenditure for reconstruction and paving if operation were continued. The cost of reconstruction would have been so great that an adequate return could not have been earned from the traffic they were handling, and the company decided to abandon these lines. The matter was laid before the city commission with the proposition to substitute frequent and satisfactory bus service, the commission approved the plan and the two parties agreed on the routing and service.

Under the new arrangement there are more bus routes and more route miles than there were rail lines abandoned. Parallel routes on both east and west and north and south streets have been established about a quarter of a mile apart with frequent service on all of them. Fifty of the 65 buses in use in Pasadena are assigned to this substitute service. Through commutation tickets good on the buses can be purchased from any point reached by any of the Pacific Electric rail or bus lines so that potentially all of them are feeders for the rail lines. Although the unprofitable rail lines were abandoned, the interurban lines and those intra-city lines which were in good physical condition were retained and a system of transfers between the rail and bus lines was established. It was found, however, that taking the city as a whole only about 10 per cent of the bus passengers transfer to the rail lines.

In Glendale, a system of lateral routes was established to avoid the necessity of extending the rail lines into unremunerative territory and these act largely as feeders for the rail lines to and from Los Angeles. In addition, three parallel through lines have been established over routes far enough away from the rail lines so that the two services do not compete with each other, but they are so arranged that they cross several of the lateral routes

tween Huntington Park and Long Beach, 16 miles, are parallel to the rail lines. In this latter instance the bus route is about a mile from the railway and does not enter into competition with it, although it is possible to travel between these terminals by rail by making a slight detour and changing cars at Watts. Another line between Highland and San Bernardino has the same terminals as the rail line but follows a different route which is noncompeting. The longest bus route in operation is that from Long Beach to Venice, 32 miles. There is no direct rail connection between these two points but this route crosses several Pacific Electric rail lines leading to Los Angeles.

Another line between South Pasadena and Monterey Park by way of Albambra, about six miles long, is a lateral route which crosses four of the Pacific Electric interurban rail lines. Besides those routes mentioned, there are a number of short routes which either extend or supplement the rail service and a number of lateral routes which act as feeders for the rail lines, all of which were introduced to give needed service in districts requiring transportation facilities but which did not supply a volume of traffic sufficient to warrant the investment in rail extensions.

#### Maintenance of the Equipment

The maintenance of the bus equipment is handled by the mechanical department of the railway in much the same way that it handles the maintenance of the railway equipment. The heavy repairs and rebuilding are taken care of at the company's main shop at Torrence, while the running and ordinary light repairs are made at company garages which have been established at division



Interior of Pasadena Garage

and exchange passengers with them. At Santa Ana the same character of service is established over the same number of lateral and through routes.

The through routes at Glendale and Santa Ana handle both interurban and intra-city passengers but the company has a number of interurban bus lines, such as those between Hollywood and Girard, 18 miles; Pico boulevard, starting near the Los Angeles city limits, to Santa Monica; La Manda Park to Michilinda; and others, all of which are extensions of the rail service but do not handle intra-city traffic. Other lines, such as the route be-

points. All general overhauling is done under the direct supervision of the shop superintendent at Torrence and under the direction of the superintendent of power and equipment. No special force has been assembled in the main shops for the purpose of handling the bus work, although several special mechanics are assigned to this work. All other work, however, including the body work and painting is done by the regular shop forces.

The inspection is quite rigid. Each car is inspected for mechanical defects every night and the lubrication is given close attention. A more careful and thorough in-

Motor Transport Section

spection is made at the end of every 2,000 miles and after 6,000 miles a still closer inspection is required.

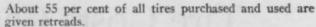
The daily inspection includes brakes, tires, steering gear, transmission, and, as mentioned, lubrication. The inspector is required to certify that the equipment is in serviceable condition and safe for use. The drivers are also required to make out defect reports daily, or at the end of any trip if necessary, to save time and assist the inspector in his work. At the time the closer inspections are made at the end of the 2,000 and 6,000 mile periods, every part is examined closely and such defects as are found are remedied before the cars are permitted to return to service. Mileage records are kept for the individual cars and separately for the tires. Also gas and lubricating oil records are kept and reduced to a mileage basis, but these latter records are not reduced to a car unit basis. When the cars go into the shop for general repairs, the work reports and requisitions show the labor and material applied to the individual cars. but as a general rule, this information is not assembled for detail reports and a history of the several cars.

Except in case of accident, the cars are not shopped until it is necessary for the motors to have a general The buses in this service are not required overhauling. to meet the heavy duty which is demanded of most long distance stages on the heavy mountain grades along the Pacific coast, and the periods between shoppings average about two years. Depending on the particular assignments which are made of the cars, the mileage in these periods varies from a minimum of 60,000 to an average maximum of 85,000 miles.

The cars in use are principally White, Moreland, and Fageol models. None of the parts are specially designed so that standard parts are purchased and applied for all repairs and replacements, and no parts are made by the railroad. The manufacturers paint and number the cars in accordance with the standards of the company so that, when new cars are purchased, all that is necessary is to fit them with cash registers and signs before they are put into service. They are then assigned to regular service without a preliminary breaking in period, and this system has been found to be quite satisfactory. seating capacities vary from 16 to 29 passengers and the various sizes of cars are assigned to the several runs in accordance with the traffic requirements.

Depreciation from an accounting standpoint is not based on mileage but is predicated on a total useful life of four years. The

of four years. total mileage, includ-ing the 40 buses in Los Angeles which are used entirely in intra-city service, is 4,200,000 miles annually, or slightly in excess of 2,000 miles



The bus drivers have the same seniority rights as the trainmen from whose ranks they are drawn. The rates of pay are the same as those for the one-man interurban or intra-city cars, which is a differential of four cents over the rate where there is a full crew. Every train-man in a potential bus operator although it has been found that a few of the trainmen are unable to qualify as



Body Rebuilding at the Torrance Shops

drivers after they have taken the necessary instruction. The men are well satisfied with the arrangement as they are permitted to transfer back to the rail lines if they so

The bus system which the Pacific Electric has brought into existence is an example of what can be accomplished by a railroad in a densely populated area without altering or increasing its supervisory organization. The system which has just been described is administered by the regular rail operating organization in substantially the same manner as it handles its rail operations except that the dispatchers do not have jurisdiction over the buses, although they do record the time of leaving and arriving at terminals on a special section of the train sheet as a check on the time slips.

The operating organization finds that while new problems have been introduced, most of them are the same, fundamentally, as those they have been familiar with in the rail service, and nearly every solution is along the same lines as those they have been following for years.



A Mack in the Service of the Yakima Valley Transportation Company, a Union Pacific Subsidiary.

### Tire Costs Can Be Reduced\*

Attention to factors causing failures, and their elimination, will be reflected in greater mileage ....

By G. M. Linforth

Goodyear Tire & Rubber Company, Akron, Ohio

EN minutes inspection in the garage is better than an hour spent in change-over on the road. This parapharse of the "ounce of prevention" adage is true in bus and truck transportation to an even greater degree than the one to six ratio suggested. It is vital to the success of the operator who wants to furnish satisfactory transportation at economical cost.

The operation of a bus or truck is not different from the operation of a private automobile, except in degree.

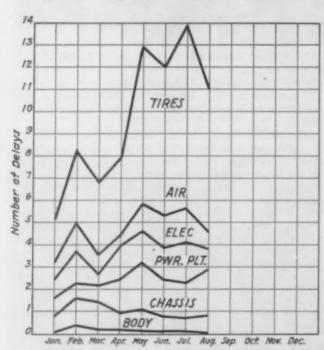


Fig. 1-Coach Delays Per 10,00 Miles, 1926

Where an automobile owner may drive his car 6,000 miles in a year, a bus operator may get 4,000 miles or more in a month. Where the load carried in a passenger car is normally well within the safety margin provided by the tire manufacturer, in the case of the truck the actual loads vary considerably with the cargo carried, and in the case of buses are affected by whether standees are permitted, the presence of baggage racks and special equipment, and other factors. The roads and the grades traveled may require more frequent use of the brake, increasing brake-drum temperatures.

#### Expense of Tire Falures

In the matter of tire service the individual car owner is apt to gage this by the length of time the tire remains on his car while the truck and bus operators must measure it in actual mileage since it directly affects his transportation cost per mile and the profit he may make.

A flat tire is an annoyance and an inconvenience to an individual car owner. To a fleet owner, involuntary stops are not merely expensive in tying up the coach and in the delay and cost of getting a service car out, but also in affecting the popularity of his fleet with the public as a transportation agency. Finally the individual car owner ordinarily drives his own car and, actuated by pride of possession, or economy, or both, exercises ordinary care in its operation, whereas the truck or bus is usually operated by someone other than the owner, someone who hasn't the same incentive to take care of the truck or bus he is driving.

In any event the minor things that we all are careless about in driving our own cars, such as over-use of the brake, rubbing against the curb, riding sometimes in the car tracks, and so on, are still comparatively negligible in their results, while these same things in a bus or truck, which must drive many times the mileage of a private car, are magnified and their destructive results correspondingly multiplied.

When we speak then of the ten minutes in the garage in inspection and prevention work, we are talking about those things which directly affect the mileage a fleet owner will get from his fleet and the return in dollars he will get from it.

That attention given to things that seem minor and

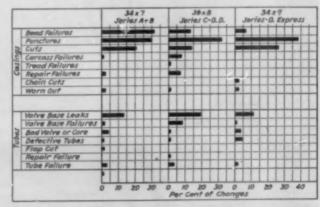


Fig. 2—Causes of Tire Changes, Five-Month Period Ending May 31, 1926

comparatively unimportant still pay handsomely for themselves in added mileage, and that lower cost per mile can be definitely proved, will be shown in the charts used in this article.

#### Reducing Tire Costs

In any inquiry into operating factors in so new a transportation agency as the motor bus or truck, the first thing to do is to find the facts. The graphs and explanations that follow are largely self explanatory, being the facts assembled as a result of a number of studies made

<sup>\*</sup> Adapted from a paper read at the Society of Automotive Engineers meeting at Boston, Mass., on November 16, 1926.

fleet owner.

Figure 1 shows the causes of involuntary delays on a typical bus operation, the figures being collected over a six months' period. The number of delays caused by six months' period. tire and tube trouble indicate that the operator must exert every effort to reduce tire trouble. That more trouble may be expected from tires during the summer months, is also reflected in this graph as indicated by the increase in the number of tire delays commencing with the month of May.

The fact that most of the delays occur at peak hours makes it doubly imperative to seek the causes and to find ways to prevent or reduce them. Since tire trouble is one cause for these delays we see in Fig. 2 and Fig. 3, taken from two typical operations, why the tires failed.

Bead failures may be an inherent weakness in the tire, or may result from operating conditions that create extreme brake-drum temperatures, resulting in premature tire failure at the bead where the heat is greatest.

#### Regular Inspection Will Reduce Punctures

Punctures we have with us in every pneumatic tire operation. The number can, however, be reduced by regular inspection and early treatment of cuts and minor injuries. In the operations shown on Fig. 3 the predominance of cuts was found partially traceable to the habit of bus drivers driving on the car tracks-which was later corrected.

We found incidentally in another operation a considerable number of tires coming in which showed no cause for going flat. It developed that some of the drivers let the air out of the tires at the end of the line and called up, reporting a tire failure so as to get a little rest or layover. That condition of course was stopped.

Temperature and rainfall affect the life of tires. cold weather, the heating-up process within the tires due

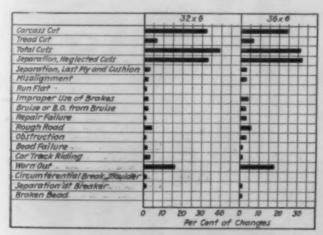


Fig. 3-Causes of Tire Changes, Seven-Month Period Ending July 31, 1926

to the flexing of the plies is partially compensated for by the low temperatures outside. In rainy seasons when many drivers put on chains there is the likelihood of loose ends of chains becoming detached in the street and cutting the tires of other vehicles that strike them. Skidding too, on rainy pavements, is hard on tires. While weather is still a factor in the life of a tire, it is apparently true that brief hot or rainy spells are not immediately reflected in tire changes.

It is helpful to know just where, on a bus, the most flat tires occur. Misalinement of wheels, excessive brake-drum heat, interference between the tire valve stem

into the question of reducing operating costs for the and the wheel, or even faulty brake adjustment and operation will reflect themselves in an abnormal number of tire changes, and Fig. 4 throws light on this subject.

A great deal of study has been given to brake-drum heat and its influence on tire performance. Some headway has been made, though this question still presents serious difficulties.

The left half of Fig. 5 shows conditions found in a number of large bus operations of both city and interurban type. Taking existing equipment we found brakedrum temperatures of around 492 deg. above atmospheric and 577 deg. actual. With such brake-drum temperatures and with tire beads subjected to 301 deg., the destructive influence on the rubber is obvious.

Mere increase of wheel diameters will not prevent such destructive temperatures. Promising results have been obtained by the use of a wheel of larger diameter used

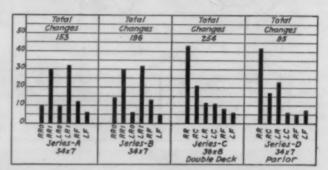


Fig. 4-Distribution of Flat Tire Changes, Four-Month Period

in conjunction with a baffle of sheet metal covered with asbestos between the brake-drum and the rim, acting as a deflector or shield from the rim and the tire.

Note the temperatures obtained with this equipment. The rim, or rather the tire bead, shows only 179 deg., the baffle 379 deg., while the brake drum temperature remains as in the first instance, around 577 deg

It has also been found that spoke wheels, acting as a fan, have favorably affected temperatures as they provide more ventilation for the brake-drum.

Another interesting result of excessive brake-drum temperature is the increase in the air pressure in the tire. An initial pressure of 110 lb. in the inside tire in the morning may develop into a pressure of 135 lb. later in the afternoon. Pressures much in excess of this have been found, some of them far beyond the margin of safety of the tire, when the rubber is softened by high temperatures. Such conditions are likely to result in bruising the tire and blowing out the carcass or pulling out the tire beads.

A check on the temperature of the air in tires when the coaches return in the evening is also of interest. The rear inside tires located directly over the brakedrum, and with less opportunity to radiate heat, show much higher temperatures than the rear outside tires where the flexing of the tire itself is the chief source of heat.

#### Balloon Tires

One of the newest and most interesting developments in this new type of transportation is the adaptation of balloon tires to trucks and buses. Four sizes are most likely to come into general use. The existing six-inch high pressure tire can be replaced with a low pressure tire of 7.50 cross-section for which a recommended load of 2,100 lb. is indicated, or by a low pressure tire of 8.25 cross-section for which a load of 2,500 lb. is recommended. In the case of the 7.50 tire, we feel that its use should be confined to vehicles upon which the present six-inch equipment is not overloaded and in the case of the 8.25 tire, best results will be obtained in confining its use to loads somewhat in excess of the six-inch high pressure load, but lower than the next higher size.

The seven-inch high-pressure tire is replaced by the 9.00 balloon tire carrying the same load as that recommended for the tire it replaces (3,000 lb.).

The eight-inch high pressure is replaced by the 10.50 balloon carrying 4,000 lb. (inflation in each case is

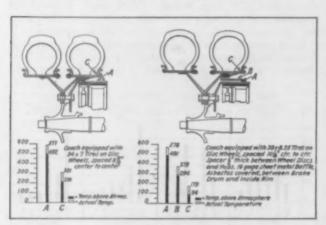


Fig. 5

based on 45 lb.), as compared with 90 lb. for the six-inch, 100 lb. for the seven-inch, and 110 lb. for the eight-inch.

A few of the advantages to be obtained through the use of balloon tires from an operator's viewpoint are as follows:

1. More comfort for the passengers, hence they are an aid in the sale of transportation.

Lower mechanical upkeep as they provide considerable cushion for the vehicle.

Greater ground contact, thus providing greater traction and at the same time considerably reducing skidding.

4. Increase in the average speed without an increase in the maximum speed of the vehicle due to the fact that drivers do not need to slow down for every rough spot in the road and can make sharper turns with more safety.

5. Tire mileage is likely to be favorably affected; this in some operations has amounted to as much as 50 per cent.



Union Station at Worcester, Mass.

#### Gasoline Pump for Motor Buses

A GASOLINE pump, known as the No. 89-R, has recently been placed upon the market by S. F. Bowser & Company, Fort Wayne, Ind. The new pump is a continuous operating air-driven pump, which is controlled from the hose nozzle and was designed especially to take care of the needs of railroads operating buses, trucks and other motor equipment.

This new pump is especially designed for fueling gasoline coaches and gas-electric cars. The principal feature of the pump is in the remote control. The attendant who fills the gasoline tank of the coach inserts the hose nozzle in the tank opening, opens up the discharge nozzle which releases the pressure built up in the cylinder of the pump and operation begins.

This pump will continue to operate just as long as the attendant holds the discharge nozzle open. It requires but an 80-pound air pressure to operate it at its maximum efficiency. It will discharge 20 gallons a minute. If the opening in the gasoline tank of the bus or motor rail coach is large enough so that the tank will receive gasoline faster than 20 gallons a minute, an increase in the air pressure will effect some increase in the rate of gasoline flow.

With the flow of gasoline controlled at the discharge nozzle, it is possible to dispense with the services of one man in servicing motor buses and gasoline coaches.



A Gasoline Pump for Fueling Motor Coaches in Which the Flow Is Controlled at the Nozzle

The operator is always at the end of the hose where he can see exactly what he is doing. He may regulate the flow of gasoline by opening up or closing the discharge nozzle.

This pump is equipped with a centrifugal water filler which removes moisture from the gasoline in much the same manner as a cream separator removes the cream from the milk. It is also equipped with a recording meter which totals up the number of gallons of gasoline discharged from the pump, thus enabling the operator to keep an accurate check on the number of gallons of fuel delivered to each vehicle.

# Tools That Will Save Maintenance Money

Stands, boring fixtures and other special tools make repair work easier and more economical

By A. H. Leipert, International Motor Company, New York

THE average repair shop classifies work as follows:

1. Tearing down the chassis. This consists of the removal of motor, transmission, steering gear, radiator and axles, etc., and work on springs, brakes

and control.

2. Overhaul of engine and associated units.

3. Transmission and rear axle overhaul.

4. Work of precision machine and special tools.

5. Cleaning, testing and inspection.

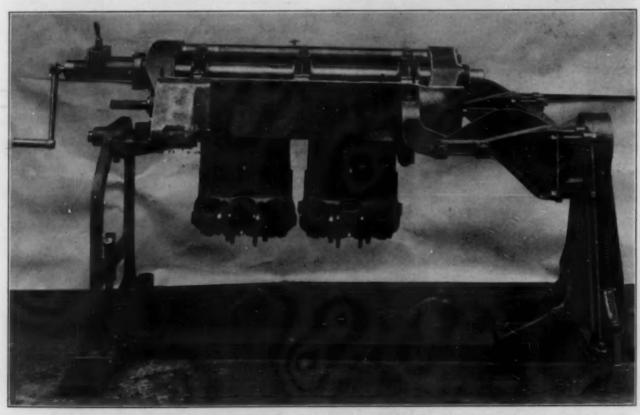
6. Wrecking truck and emergency service.

Tools and fixtures of one nature or another are required to accomplish or expedite each of these classes wrenches, speed wrenches, pullers, holding fixtures and stands are of this class.

Sturdy and properly designed stands are more necessary for trucks than for pleasure car repairs, for the weight of many truck units is more than the average mechanic can lift conveniently.

#### Stands

For example, the transmission and bevel gear assembly of a Mack 5-ton or 7½-ton chain drive truck weighs about 750 lb., filled with lubricant. It is held to the frame at three points by jackshaft frame bracket caps, right and left, and by two large transmission front support bolts.



Main Bearing Fixture Installed and Ready to Bore

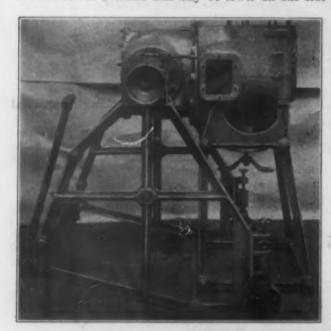
of work. However, we will concern ourselves with the special tools and fixtures that we have found can be used to advantage.

There are many special tools and fixtures that are not percision tools—but tools of convenience. Special

It is not difficult to remove four cap screws and two nuts, but since the design logically provides for the removal and installation of the transmission from beneath the chassis, leaving the body in place, a fixture, in this case a dolly, is provided to do the work of six men and with greater safety and speed. This dolly is wheeled under the truck and each of the three jacks is spun up

From a paper presented at the Society of Automotive Engineers meeting at Boston, Mass., on November 16.

to support the two jackshaft housings and the bevel pinion housing at the front. After the six cap screws and nuts are removed, the transmission is lowered and pulled over to the transmission stand. The three jack screws are not inter-connected. The transmission may be quickly lifted into position for easy replacement of holding screws, making due allowance for unevenness of the floor or a frame that may be lower on one side



Transmission Assembly Stand

because of worn tires or unequal distribution of load. The transmission is placed in this stand for disassembly and overhaul. The two parts are usually together when the transmission and bevel gear housing assembly are placed on it. The transmission proper is held to the right hand part by a screw which enters the drain plug hole and the bevel gear housing is held in the left hand part by clamps holding each jackshaft housing. The screws holding one unit to the other are removed and the two parts of the stand separated. The bevel gear housing is turned up in its stand to the most convenient working position. Work may be carried on on both units at the same time. After work is completed on both units, the two parts of the stand are wheeled together and the connecting bolts are replaced.

gether and the connecting bolts are replaced.

The motor engine stand is also light, considering its great strength. This stand can be turned to any angle desired for convenience. One of the chief features of this stand is that the absence of side rails permits the mechanic to stand close enough for comfort while working on bearings.

#### Fitting Main Bearings

There are several ways in which new main bearings are fitted to the crankshaft; by hand scraping; by reaming or line reaming; by burning in; by boring. Let us take up these methods in order.

1. Hand scraping is the earliest method used and requires only simple hand tools, plus plenty of time and a man who knows how. Bearings well fitted by the hand scraping method are always tight at first, and must be run in very carefully. It is often necessary to run the engine on a belt for a number of hours, followed by a run under its own power but with light load and excess lubrication. In fact, excess lubrication and moderate

speed are advocated for a given period after delivery to the customer in order to avoid the danger of burned out bearings.

2. Since the amount of metal to be removed from a replaced bearing is considerable, expanding hand reamers have been used, but the bearings must still be finished by hand scraping. This practice naturally led to line reamers having the same purpose and designed to keep the bearings in line at the same time. This is a step ahead, and, if the line reamer is designed especially for an engine, gives fairly good results but being a self-centering device and not particularly rigid the results are not as good as are obtainable with a boring fixture. Considerable hand scraping is therefore required to correct misalignment after using a line reamer.

3. Burning in bearings appears to be a rather brutal and crude method. Yet the results obtained in a light and very popular car are uniform and not so bad. Here the engines are turned by outside power while the bearing caps are gradually tightened. The frictional heat generated in the bearing causes the bearing metal to flow and conform in shape and size to the crankshaft journal. A stream of lubricant is directed on the bearing during the process.

#### The Boring Fixture and Its Use

4. The main bearing boring fixture consists of a rigid bar extending through all the bearings and having a bracket assembly to hold it in exact position. Adjustable fly cutters are mounted in the bar, which is fed slowly through the bearings.

In the first place the cylinder blocks should be in place on the crank case and all stud nuts tight. The motor support bolt nuts and main bearing caps and nuts should be tight and their position marked. In other words all bolts and studs should be under the same tension as when the engine is assembled ready to run. Alignment is indispensable if the job is to give full satisfaction

The two brackets are rigidly connected by a tube. There is no adjustment; the brackets do not slide on the tube. All centers are definitely fixed and cannot vary.



Connecting Rod Straightening and Aligning Fixture

This bracket assembly is mounted on the crankcase at three points. Two tapered locating plugs entering the front and rear camshaft bearings hold the bracket assembly parallel to the upper face of the crankcase, and the center line through the main bearing seats. Since the distance between the center of the tapered locating plugs and the center of holes in the end brackets for the boring

bar is exactly equal to the center to center distance between the timing gears when meshed on their pitch lines, there can be no variation to cause excessive noise and

This is particularly important when case hardened and ground helical timing gears are used. Soft gears may wear in and allow a measure for liberties taken with their pitch lines by inexact bearing finishing methods. That is one fault to be found with self-centering line reamers, which provide no means of holding to the center-to-center distance between shafts. An element of weakness and opportunity for error exists in boring bars

which are made adjustable.

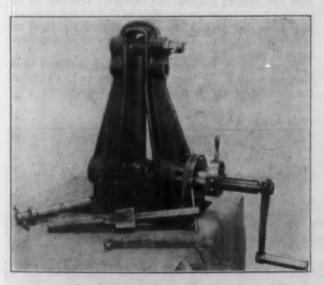
It is well to understand that an aluminum crankcase is not absolutely rigid and there are many things, such as the gradual relieving of casting strains, even after proper annealing or actual compression of stretching of the metal because of the tightening of cylinder, bearing cap and other nuts, that cause deformation amounting to a few thousandths of an inch. If alignment and accuracy to a thousandth of an inch or better is expected, the conditions of the assembled engine must be duplicated and then no stress introduced in the bearing finished process to disturb this condition or the alignment of any parts.

With this boring bar this condition is assured by providing that the excess bearings metal be removed by a sharp fly-cutter, for each boring. In the case of a threebearing crankshaft the cutters are disposed at 120 deg. around the boring bar. The bar is 25% in. in diameter and is obviously of a degree of stiffness not to be affected by the tools cutting soft bearing metal.

#### The Set-up

The boring bar with cutters removed is pushed through the two brackets and the main bearings assem-

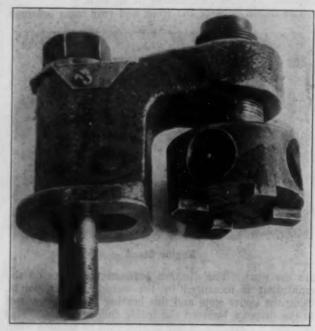
The cutters are inserted in the bar and each set from measurements taken from each crankshaft journal.



Connecting Rod Boring Fixture

Of course, the crankshaft has been verified and straightened and ground—if necessary—before measurements are taken therefrom. Then each cutter is set to bore its bearing to a diameter one thousandth greater than the diameter of its crankshaft journal. The translation of crankshaft measurements into cutter setting measurements is accomplished by a table which includes allowance for clearance.

Obviously, the mechanic who makes these measurements must have a good micrometer touch in order to obtain the desired accuracy of clearance. An error of a half thousandth in setting the cutter would make the clearance nil in two thousandths of an inch. One man is assigned to this work and care is taken that the micrometer parts and tools are at uniform temperature. A man of suitable temperament, even though he is no



Valve Cap Removing Tool

machinist, can be trained to become an expert in the use of this tool. The centering of the boring bar in the bearings is accomplished by adjustment of the clamp screw and jaw assembly which is integral with the bracket tube. This clamps on to the crankcase flange and two screws raise or lower the boring bar as required.

#### The Operation

We are now ready to start boring-so we push the bar in until the cutters are about to enter the bearings. clamp on the turning crank, engage the feed block nut and turn the crank until the cutters have bored clear through the bearings. The edges of the bearings must now be faced to provide end clearance and to cut the fillet, so the boring fixture is removed and the main bearing facing and filleting tool is employed.

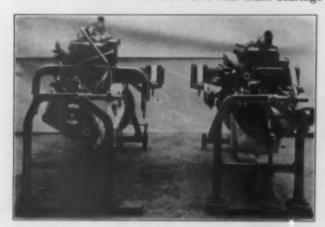
The adjustable bushing of this tool is expanded in the center main bearing, the ratchet wrench put on and the feed nut and spindle assembly used to exert the required pressure on the cutter bar which carries three facing cutters and one cutter for the fillet. After one bearing face is finished the tool is turned to cut the other side.

We have a special trammel which is used to make measurements on the crankshaft and bearings so as to provide the desired end clearances. It is a type of inside and outside a caliper, but has the special feature of allowing the prescribed end clearances automatically.

This trammel bar has several pairs of conical depressions in which the two adjusting setscrews of the adjust-able member engage. The distance between these two able member engage. screws and the holes differs slightly so that close adjustment can be made by screwing them in and out. Both screws are kept engaged so that the adjustable member is clamped firmly.

In order to complete the facing of the center main bearing the distance between the fillets on the crankshaft is gaged with inside caliper gage points and bearing is cut to conform to the distance between the outside caliper gage points, using the lower step on the adjustable member gage point. This allows the required end clearance of three-thousandths of an inch.

The inside faces of the front and rear main bearings



Engine Stand

are cut next. The distance between the fillets on the crankshaft is measured by the outside caliper points, using the upper step, and this bearing faced to conform to the distance between the inside caliper points. This provides a clearance of five thousandths of an inch when the crankshaft is centered in the center bearing.

When the crankshaft is assembled in these bearings and the bearing cap nuts tightened to their marked positions it will be found that the shaft will turn freely. This is a revelation to those accustomed to laborious running in of bearings finished by other methods. Despite the accuracy with which this work is done, the time taken is a few hours as against several days required by hand scraping methods. The cost in this case for precision work is less than if an inaccurate method were employed.

When the owners contemplate the time their vehicle must be out of use in order to hand-scrape new bearings, they are inclined to defer the evil day until the engine actually breaks down. This is a dangerous and expensive practice which is eliminated when their shops are equipped with boring fixtures.

#### Boring Connecting Rod Bearings

Connecting rod bearings are bored with the same degree of precision by means of another boring fixture. However, before this work is done each rod is installed in the connecting rod straightening and aligning fixture for verification or needed alignment.

This fixture is particularly sturdy so that the rod may be straightened while mounted in the fixture. This feature is a great time-saver. The rod is assembled with a solid crank pin bushing, the inside bore of which is tapered the same as the crankpin mandrel on which the large end of the connecting rod is mounted and held in the fixture. After the mandrel is firmly seated in the tapered bushing the right and left clamp set screws are adjusted so that the sides of the connecting rod clear the fixture. The connecting rod wrist pin is replaced by a wrist pin mandrel. A bend in the rod is indicated by the relative clearance between the two ends of the wrist pin mandrel and the vertical lands on the foot of the fixture.

A twist in the rod is indicated by the relative clearance between the ends of the mandrel and the horizontal lands on the fixture. Because of the length of the wrist pin mandrel, any deviation is exaggerated so that rectification is made easy.

When the new bearing is seated in the connecting rod it is mounted in the boring fixture. It is hung from the wrist pin mandrel at the top of the fixture while the boring bar is removed. The tapered locating plug is pushed into the fixture in place of the boring bar to center the big end bearing. While the plug is in place, the clamps on either side of the rod are drawn up tightly, the plug is removed and the boring bar pushed in. The cutter carried by the bar has been adjusted to bore the bearing one thousandth of an inch, larger than the measured diameter of the crank pin on which it is to run. As in the case of main bearings a table is used to convert crankpin measurement into cutter setting measurement with proper clearance allowance. The bearing end faces and fillets are cut by this facing tool which cuts both edges at once.

#### Valve Cap Removing Tool

To get out of an atmosphere saturated with ten thousandths let us examine a valuable time saver. valve cap removing tool is not large, but is is a bulldog for hanging on. Unfortunately there are those who like to replace valve caps with shellac or other ingredients whose qualities are admirable when applied to certain joints and gaskets but quite the reverse in valve caps. Likewise, a drift or chisel often is found in the hands of a man removing a cap, in place of the spanner provided for that purpose. The result is that the stuck valve caps with damaged lugs are brought to the service station for quick removal. There is nothing quick about drilling out a cap, so this little fixture is called on. It succeeds because of its design and great strength. The spanner head is kept constantly in contact with the valve cap with any desired amount of pressure. The lead of the spanner head screw corresponds to that of the valve cap threads so that contact is maintained until the valve cap is screwed entirely. Two men at the end of a six foot har will move any cap.

Tools such as we have described are designed to do accurate work in the least possible time and to eliminate the element of variation of time and uncertainty.



A New England Transportation Company's North Eastern Bus at Canton Jct., Mass., Station of the N. Y., N. H. & H.



The Original Parlor Type Bus-Proper Maintenance Still Keeps It in Service.

## Four Garages Maintain North Shore Line Buses

Twenty employees handle cleaning and repairing of 38 coaches—New facilities at Waukegan

THE Chicago, North Shore & Milwaukee, an electric line extending from Chicago to Milwaukee, Wis., and more familiarly known as the North Shore line, is a pioneer middle western railway operator of buses. Beginning in a small way some five years ago this company has steadily augmented its fleet and expanded its operations. At the present time its fleet consists of 38 buses of various types.

consists of 38 buses of various types.

The maintenance problem of the North Shore line is complicated by the fact that its bus operations are not centralized but radiate from four principal points. At the present time it is operating 10 distinct routes. The principal one of these extends from Waukegan, Ill., to Kenosha, Wis., a distance of 16 miles. A total of 18 round trips are operated over this line daily. Two other lines radiate from Waukegan. One of these extends to Antioch, a distance of 20 miles, and three round trips daily are operated over it. The other extends from Waukegan to McHenry, 25 miles, and a similar daily service is maintained on this line.

Another principal line extends from Niles Center terminal to Desplaines, Wauconda and Volo and is 34 miles in length. Ten round trips are scheduled daily as far as Desplaines, two to Wauconda and one to Volo. On the 40-mile line from Kenosha to Lake Geneva three round trips daily are operated at this time.

Another bus line extends from Niles Center terminal to Wheeling, a distance of 12 miles, and four daily round trips are made on it. Another line serves the territory between Antioch and Wheeling, a distance of 29 miles, one round trip daily being made over the entire line, another between Antioch and Libertyville and a

third round trip between Fox Lake and Libertyville. An eight-mile line extends from Glencoe to Wheeling, over which one round trip is made daily, and two daily round trips are made on a four-mile line extending from Evanston to Niles Center.

#### Four Garages Maintained

The tenth line extends from Highland Park via Northbrook and Glenview to Wilmette, a distance of 16 miles.



Several North Shore Buses Have Run Over 200,000 Miles

Fourteen daily round trips are made on this line between Highland Park and Northbrook, five make the complete run from Highland Park to Wilmette and four are operated daily between Glenview and Wilmette. In addition, one round trip daily is made between Highland Park and Deerfield on this line. The North Shore line also once operated parlor coach service on two routes.

One of these extended from Milwaukee to Kenosha and the other from Waukegan to Chicago. These lines are not now in service, however.

not now in service, however.

To meet the condition of its somewhat disconnected system of bus lines, the North Shore line has established garages at the four principal terminals. One of these is located at Evanston and services buses radiating from that point. This garage has dimensions of 60 ft. by 120 ft. The shop is located in the rear and the storage space, towards the front, has a capacity of 15 coaches. A second garage for the servicing of buses operating in that vicinity is located at Highland Park. This garage,



with dimensions of 50 ft. by 120 ft., has storage capacity for eight coaches and also has shop and battery repair equipment. The third garage, located at Kenosha, has dimension of 75 ft. by 120 ft., and is equipped with shop

facilities and has storage capacity for 15 buses.

The principal garage is located at Waukegan, which is the center of the bus activities of the North Shore line. The other three garages are equipped with facilities for making running repairs to buses but all heavy repair work is done at the Waukegan garage.

work is done at the Waukegan garage.

This garage was built about a year ago especially to meet the maintenance requirements of North Shore line

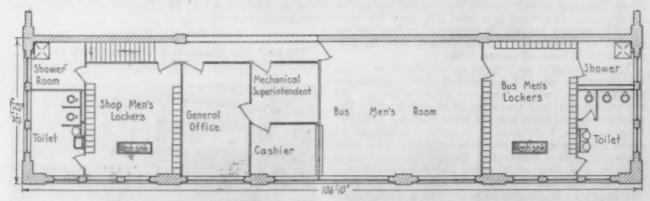
washed at any place in the building. In addition, there are four special washstands in the center of the storage space. Gasoline, water and air are furnished the buses from a special concrete stand, located just inside the main driveway door at the right as the buses enter. Gasoline is pumped to the gasoline stand under remote control pressure.

As shown in the accompanying floor plan, some twothirds of the floor space is devoted to the storage of the buses. Two pits for light repairs and inspection are located adjacent to the workbench, which adjoins the wall towards the rear of the garage. Back of this are located the facilities for heavy repairs and in the rear left-hand corner is the store-room. Opposite the storeroom are the paint and carpenter repair shops. The paint shop is equipped with a power paint sprayer.

The electrical equipment of the garage is particularly complete. Outlets for reel lights are located at frequent intervals throughout the garage and eight motors with three-phase outlets are provided for the air compressor, the woodworker, the lathe, the drill press, the gas unloaders and the oil pump. The rolling steel doors are operated by three horsepower single phase motors. Two forced draft ventilators remove gases and keep the air in the garage fresh.

The mezzanine floor where the offices and other rooms are located extends the full width of the garage at the front and is approximately 25 ft. wide. It is reached by an iron stairway. As shown in the accompanying floor plan, the hallway leading from the stairway gives entrance to the offices of the mechanical superintendent, the cashier and the general office, as well as to the rooms used by the employees. Separate rooms are provided for the shop men and the drivers. The shop men's locker room is equipped with steel lockers and has a wash sink. A shower bath and toilet are also provided for the shop men.

The largest room on the mezzanine floor is that used by the bus men for their regular meetings. A counter located next to the office of the cashier is used by the drivers for the making out of their daily reports which are delivered to the cashier through a window. Back of



Mezzanine Floor Plan of Waukegan Garage

buses and it represents the design considered by the North Shore line to be the best for its purposes. It is a one-story structure with a mezzanine floor at one end, providing offices for the manager of motor coach operations and his assistants, the cashier and rooms for the bus drivers and mechanics. The main floor is approximately 172 ft. long and 107 ft. wide. The entire structure is of reinformed concrete with a face brick exterior finish.

One of the first considerations in the design was to furnish ample drainage in order that buses might be

the meeting room is the bus men's locker-room, which has steel lockers and a wash sink, as well as a shower bath and toilet.

#### Tools

The three small garages have tools only for making inspections and light repairs. The Waukegan garage, however, is equipped with a lathe, a drill press, three grinder heads, a cylinder honing outfit, an engine stand, a press, a Universal woodworker, a complete battery overhaul and charging outfit, and a valve refacer.

Motor Transport Section

The maintenance personnel of the North Shore line consists of six mechanics, eight mechanics' helpers, two painters, three carpenters, one janitor and a cleaner. These men man the four garages, each of the smaller garages having one mechanic and one helper working in evening shifts. These men do only the periodical inspection and incidental overhaul work that is necessary from time to time. The foreman is located usually at the Waukegan garage but he moves from one garage to another as required.

#### Plan of Maintenance

All buses are subjected to a thorough inspection after each 2,000 miles of operation. These inspections are carried out at all garages, but when general overhaul is necessary the buses are brought to the Waukegan garage if they are not regularly located there. Minor failures or defects are reported by the drivers on their "operator's report forms" and such repairs are usually made at night. All of the other work including heavy repairs and overhauling is performed in the daytime in all garages, except washing and cleaning, which is also done at night.

F. A. Klock, assistant manager of the motor coach department of the North Shore line, is in direct charge of the maintenance of the buses. His assistant is J. M.

Sill.

#### Buses Replace Trains on C. M. & St. P. Branch

PASSENGER train service on the stub line of the Chicago, Milwaukee & St. Paul from Racine, Wis., to Sturtevant, a distance of approximately eight miles, was discontinued about a year ago and was replaced by motor bus service. Mail, baggage and express, as well as passengers, are carried by the buses, which at the present time make seven round trips between Racine and Sturtevant daily.

Sturtevant is a station on the main line of the St. Paul between Chicago and Milwaukee and is the junction point of the main line with the branch line to Racine. Formerly a number of passenger trains were operated between Racine and Sturtevant to connect with main line trains and this is the service which has been taken over by the buses.

The running time of the trains was 25 min., and that of the buses varies from 30 to 40 min. Stops for pas-



One of Two Yellow Buses Operated by the C. M. & St. P. Between Racine, Wis., and Sturtevant

sengers are made only at Racine Junction and Gatliff, as well as at Racine and Sturtevant. The accompanying table shows the present schedules on the bus line. It will be noted that these are so arranged that one bus is able to make all of them, the other one being held in reserve. The bus in operation is running almost con-

stantly from 6:30 a.m. to 9.20 p.m., with the exception of a period of 1 hr. and 40 min. between 12:50 and 2:30 p.m. Five round trips are made daily, the other two schedules being operated daily except Sunday.

schedules being operated daily except Sunday.

Both buses operated by the St. Paul were manufactured by the Yellow Truck & Coach Manufacturing Company, Chicago. They are of the inter-city type having seats for 24 passengers, with a baggage compartment at the rear. The seats are deeply cushioned and are of the coach type, each accommodating two passengers. Passengers enter the bus through a door at the front on the right side and reach their seats through an aisle which extends down the middle of the bus.

The mail, baggage and express compartment is reached through a door on the right hand side at the rear. Although the space for such traffic is limited, it is usually sufficient to accommodate ordinary movements. In the

C.	M. &	St. P.	Bus So	CHEDULES			
Racine (leave) Sturtevant (arrive)		A.M. 8:00 8:30	A.M. 10:45 11:20	F.M. 12:10 12:50	P.M. 3:40 4:15	P.M. 4:55 5:30	P.M. 7:00 7:40
Sturtevant (leave) Racine (arrive)		A.M. 8:45 9:25	A.M. 11:20 11:55	P.M. 2:30 3:10	P.M. 4:20 4:50	P.M. 5:40 6:20	P.M. 8:40 9:20

event of the necessity of handling more mail, baggage and express than the bus can accommodate, this traffic is carried by truck.

The buses are operated by former railroad employees and tie up over night in a rented garage at Racine. The ordinary servicing of the buses, such as washing, greasing, oiling and fueling, is taken care of by the drivers. When repairs are necessary, the buses are taken to Milwaukee where the work is done in the railroad shops by regularly employed mechanics.

Traffic on the branch line has always been light and was never sufficient to pay the out-of-pocket expenses of train operation. With the lower cost of bus operation, however, the traffic handled is sufficient to pay operating expenses. Up to the present time the bus line has not earned any net but it has greatly reduced the losses for-

merly incurred under train operation.

#### The Columbia Electric Bus Hoist

HE electrically operated bus hoist, manufactured by the Columbia Machine Works, 3303 Atlantic avenue, Brooklyn, N. Y., is set in the floor of the garage or shop. The electric motor which furnishes the power, and the worm wheels are about 2 ft. below the floor level, while the screw pipes extend into the ground about 7 ft. Two I-beams 18 in, 24 in. or 27 in. in width, according to requirements, constitute the tracks onto which the bus rolls when it comes in for inspection or repairs. Wooden platforms hinged to the sides of these tracks fold over between the flanges when the hoist is not in use so that the whole machine is flush with the floor. It thus forms a firm surface strong enough to hold up any cars which may be driven over it.

When a bus comes into the shop, the platforms covering the tracks are folded back and the bus is guided into the open grooves. A button is pushed and the hoist raises the car at a speed of  $2\frac{1}{2}$  ft. per min. With the bus raised, repair men can work under it, standing between the track spaces on the cement floor which is between 5 ft. and 6 ft. wide and from 20 ft. to 30 ft. long. While men are working under the bus, others can wash the body or repair the motor, working from the hinged platforms on the tracks. These platforms run along both sides of the bus for its full length.



# B. & M. Finds Merit in Co-ordinated Highway Service

Growth of motor vehicle use brings problems and a challenge equal to those faced by pioneer railroad men

By Howard F. Fritch

Passenger Traffic Manager, Boston & Maine, and President, Boston & Maine Transportation Company

road building as times when it would have been a joy to have had a part in working out the big problems of transportation, and to have participated in the stir and bustle of construction days. If we pause, however, in our daily routine and give thought to what is really taking place now in the transportation business we will realize that the problems of today are fully as big, the economic forces just as relentless, and even more complicated and involved than those of the construction period. The latter have the glamor of distance; the former are involved in our daily tasks. Railroads are now celebrating their centennials, yet a type of vehicle almost unheard of 25 years ago is providing means of transportation for three times as many passenger miles as are the railroads. It is indeed a time for the railroad man to be alert.

#### Loss of Passenger Business a Challenge

Class 1 railroads in the United States carried in 1920 1,235,000,000 passengers; in 1924 they carried 933,000,000, and in 1925, 888,000,000, a decrease in five years of 28 per cent. The decrease is due largely to the diversion of traffic to the private automobile, and to some slight extent to the competition of the motor coach. The railroads are not taking these losses as final; instead, our own line is taking them as a challenge, and we are making a fight to retain the business with better service.

The greater part of the public today is experienced in automobile travel, and from this experience has acquired a desire for conveniences in travel which it formerly dia not have. The automobile has a feature of personal

service in that it transports a single passenger or a small group of passengers from the beginning to the end of the journey without change, and at the particular time the party desires to travel. Then too, there is a certain element of privacy in automobile travel not enjoyed when traveling in a vehicle accommodating a larger number of passengers such as the railroad coach. These conveniences, I believe, have made the public less tolerant and less satisfied with train service which necessitates a change of vehicle to reach their destination, or is infrequent and does not have leaving times suiting their particular convenience.

#### Curtailment of Rail Service No Solution

Because a large volume of traffic has been diverted to the automobile the railroads have been forced to curtail rail service. This has not been popular with a public experienced in the convenience of the automobile, and has had a tendency to result in still further losses in traffic to the railroads. On the other hand the great use which is made of the automobile where the cost to the passenger is several times over what other means of transportation would cost should be an object lesson to the railroad, showing that the public is willing to pay for what it wants. This is further borne out by the fact that parlor car revenue has not been decreasing while other railroad passenger revenues have been.

The gist of the matter is that conditions affecting railroad passenger traffic have changed materially in the last few years and the railroads must adjust their methods of doing business accordingly. This they can only do successfully with a full understanding and recognition of the situation by the public which they serve, and by the commissions which regulate them. It is the obliga-

<sup>\*</sup>Abstract of a paper read before the New England Railroad Club, Boston, on November 11.

tion of the railroads to present the facts to the public, and to the commissions so that they may have an opportunity to realize the scope and importance of the problem with which they are confronted. The public in many sections is still not aware of the change in fundamental conditions. Most commissions have had numerous cases presented to them in the last two years involving the relations between rail and highway transportation, and in most states the decisions have been forward looking and constructive.

#### Commissions Friendly When

#### Railroads' Attitude Progressive

The railroads did not at first lead in recognizing the necessity of co-ordinting motor transportation with their rail operations, and in many instances independent operations were established which caused much injury to the railroads. As soon as the railroads showed a disposition to furnish necessary services, however, the commissions recognized the propriety of the established agency expanding its service rather than a new party coming into the field with probable injury to the railroad.

Unfortunately, even now there is no law in New England regulating common carrier trucks and in the United States no provision whatever for regulating interstate common carrier trucks or buses. In New England as in most of the states there are laws regulating intrastate common carrier buses.

Competition is the keenest in the short and middle distances. In these zones the difference in time as between rail and highway transportation is not as important as in the longer distances, and the convenience of reaching exact destination gives the automobile a considerable advantage. In the longer distances, however, the railroad has distinct advantages, and its traffic has been increasing. It is important that the railroads give careful consideration to their schedules with a view of catering to this class of travel where by fast and attractive service they can successfully compete with the automobile.

Local traffic on both main lines and branch lines has fallen off. There is an especially serious situation on the branch lines where the best service which was ever warranted when the railroads had all the traffic there was, was very infrequent. Now with a large part of the traffic diverted to the highway little or no service is justified in many instances.

#### Three Courses Open to the Railroad

There are three courses open to the railroad in cases like this:

- 1. Continue to operate an extravagant service at a loss.
  - 2. Abandon service.
- Provide a substitute service in a more efficient manner.

The first is an unjustifiable burden on the public served by the railroad, and simply cannot be done on some roads where a large part of the mileage is in this class. The second would be a hardship on the communities directly effected, and would be harmful to some extent to the larger territory. Furthermore, the first two courses are unnecessary because of the eminent practicability of the third. The motor vehicle which has created this problem is the angency by which the railroad can now free itself of an extravagant method of operation, and still adequately serve its customers. This applies to both freight and passenger service.

#### Bus Most Valuable as Substitute

#### for Branch Line Service

It is on the branch line as a substitute for rail service that the motor coach is perhaps the most valuable auxiliary to the railroad. A second use is in supplementing rail service to furnish an additional frequency or to care for local stops not served by through trains. A third use is to satisfy the public's desire for motor coach service for pleasure trips especially in vacation season and territory.

#### Rapid Growth in Railroad Use of Motor Vehicles

The Boston & Maine has been a pioneer in the use of the motor coach and motor truck as auxiliaries, and the New England roads now have one of the most complete networks of railroad operated bus lines in the country. Railroads from coast to coast and from border to border of the country are now using motor coaches in connection with their rail operations. The Interstate Commerce Commission figures show that over 500 buses are now operated by railroad companies or their subsidiaries, and only two and one half years ago these companies did not operate a single motor coach.

I want to speak briefly of some of the operations of the Boston & Maine Transportation Company as illustrations of the three types of use of motor coaches which I have mentioned. This company now operates 61 motor coaches on 24 routes with a total route mileage of 678. On 11 of these lines motor coaches are operated in substitution for rail service in order to provide more frequent trips and to reduce operating losses, 5 as feeders and on 6 lines to supplement rail service, and on two lines to provide a service for those traveling on pleasure during the vacation season.

#### Bus Saves Railroad Money and

#### Gives Better Service to Public

A typical example of substitution of highway service for rail service is that of the Bristol branch in New Hampshire. This is a line of 13 miles long from Franklin to Bristol. There were formerly two round trips of steam service a day. In place of these, four round trips of bus service are now operated. The saving in rail operation on this branch has been at rate of \$24,000 a year, and the revenue on the bus service is just a little more than equaling the cost of providing the service. In instances such as this the railroad is profiting by eliminatin or reducing its losses, and the public is profiting by continuing to have service which could no longer be justified by the older method. The new service in many instances such as this is more frequent than has been enjoyed for a long time.

The Bristol branch is in a hilly country where winter conditions are severe, and there were many who predicted that service could not be operated the year round. Operations for the last 16 months have demonstrated that a reliable service can be given under these conditions. During last winter there were only two days when any difficulties were experienced, one when there was an icy rain, and the other a very severe snow storm. The first did not bother rail service but the second interfered with rail service as much or more than the bus service. The successful operation of an all-year-round service on this line has changed a hostile public sentiment to a friendly one. The public find they are enjoying conveniences of service beyond what they could expect with rail service. For operations such as this the schedules of the bus service are incorporated in the regular railroad timetable with train connections shown so that a stranger is put to no inconvenience in looking up his time and planning his trip. On some routes where it is practical to do so through railroad tickets are accepted and baggage carried.

#### Eliminate Local Stops on Through Trains

In the Connecticut river valley more service was being operated between Greenfield and Northampton than was warranted by the volume of traffic, and too many of the through trains were making local stops. In order to overcome these difficulties a supplementary motor coach service was inaugurated between these points, the train service reduced, and the local stops taken off some of the through trains. This territory now has the benefit of more frequent service than could otherwise be justified, and the through trains have been improved. It is difficult to show definite financial justification for bus operations which simply make possible the speeding up of through trains by caring for the local stops, but I thoroughly believe there are cases where it is justified by the probable building up of through business by offering a more attractive service.

#### Demand for Buses Even for Longer Distances

Two long distance lines have been operated for pleasure travelers for two years now—one between Boston and Portland, and the other between Boston and the White mountains. The rate of fare maintained has been very close to the railroad fare while the running time is, of course, substantially longer than by rail. In the case of the Boston-Portland run the railroad's time is two hours and forty minutes, and by motor coach at least four hours and a quarter are required. In spite of this we find that during the summer season there is a substantial demand from the public for this type of service. During the 1926 season over 12,000 passengers were carried on this route. At the height of the season it has been necessary to run as many as 13 coach trips on this line in a day.

#### Railroad Men in Charge of

#### B. & M. Highway Operations

The passenger operations of the Boston & Maine Transportation Company extend from Boston to Bethlehem in the White mountains, and from Portland, Me., to Greenfield, Mass. This wide scattering of operations erating organization has been recruited almost entirely from railroad men. Their experience in railroad matters has been of great benefit in helping them to properly coordinate the highway service with the railroad service. The co-ordination of the services presents many prob-lems which the independent motor coach operator does not have to contend with, such as the tieing in with rail service at junctions, the handling of through ticketed passengers, the handling of baggage and mail, and the performance of a high standard of service which will compare favorably with rail service. The operating organization is entirely separate from the railroad organization but much valuable assistance is rendered by the railroad forces as their railroad duties bring them in touch with the bus operations out on the road.

#### Problems of Bus Design Not All Solved

The maintenance problems on a widely scattered system such as this are numerous and perplexing. This is especially so because the motor bus as it exists today is a relatively new product which has by no means become standardized nor have all the engineering problems in connection with their design and construction been solved. Because of its size and weight and the loads carried the problems of design are quite different

from those of the ordinary passenger automobile, and on account of the speed at which it is operated very different from those of truck design. Remarkable progress has been made in the last three or four years, and while very comfortable, durable and reliable units are being produced there is much engineering yet to be done in perfecting frames, bodies, the assembly of the two, methods

of power transmission, and tires.

As with any mechanical device more than half the battle in maintenance is to have adequate current inspection so that lubrication will be attended to, adjustments made and replacements made to avoid road failures. The parts on a motor coach are not particularly different by name from those on the ordinary passenger automobile, and it was only a very few years ago that it was felt an excellent bus could be made from a truck by putting on some of the refinements of the passenger car. Experience, however, has developed special bus chassis with low deep frames, designed for pneumatic tires and equipped with engines more refined than those used in trucks. It has been learned too that the various parts and auxiliaries such as brakes, springs, batteries, tires and shock absorbing devices must be of special design to satisfactorily stand up under the hard work they are subjected to on a motor coach.

#### Highway Vehicles Will Have

#### Permanent Place in Rail Service

One would be rash to attempt to predict the ultimate place of the motor coach with reference to the railroad but I do think it is safe to venture the opinion that the highway motor vehicle will have a prominent place coordinated as a part of organized transportation with rail service in several particular fields, where because of its charteristics it can supplement the rail service to advantage, relieving the trains of some of their local service requirements so that they may be improved to better serve long distance travelers. Likewise the motor truck will be used as an auxiliary where its characteristics make it useful.

#### Kamco Wicker Bus Seats

THE frame of the Kamco bus seats, manufactured by the Kelton-Aurand Manufacturing Company, Bay City, Mich., is constructed of 18 gage steel tubing, combined with clear rock maple. The legs are rigidly braced in all directions by steel braces firmly anchored at their ends. All the vertical strands of the wicker work are reinforced with a steel wire core. After the seat is finished and before being painted or colored, it is completely immersed in a glue bath. This permanently cements the entire construction.

A high-grade leather is used in the upholstering and the springs are designed and built to give maximum durability and riding comfort. Color, finish and upholstery are furnished in any shades or combinations that

may be desired.

A new type of floor anchorage attachment is furnished when desired. It consists of a metal hinge attached to and forming a socket for the front leg, and may either be screwed or bolted to the floor. This floor seat attachment is designed to prevent all possibility of the seat coming loose and tilting backward. The seat may easily be pushed forward, and the difficulties encountered in sweeping and cleaning of coaches are greatly reduced. Seats are quickly removed by simply pulling out the hinge pin. This type of attachment is noiseless and minimizes the wear on the floor coverings.

# Status of Bus and Truck Regulation



Motor Vehicle Conference Committee reports 34 states have control over highway common carriers



N January 1, 1927, thirty-nine states exercised control over common carrier buses and trucks operating over their highways, at least to the extent of granting or refusing to grant certificates of permission to operate. In the other nine states either there was admittedly no control over common carriers operating over the highways or claims of the power to control by certain of the commissions had never been These are the major facts of the situation exercised. relating to the state regulation of motor vehicle common carriers presented in the 1927 edition of the digest of state laws in force on January 1, 1927, prepared by the Motor Vehicle Conference Committee of New York.

During 1927 the legislatures of all states which do not now regulate their common carrier buses and trucks will meet in regular sessions and at least some of them are expected in those sessions to enter the list of states regulating their highway carriers. Bills for complete bus and truck regulation and taxation are pending in the legislatures of several of these states, notably Missouri

Of the nine states which do not exercise regulation of bus and truck common carriers, Georgia and Tennessee claim that they have the power to do so but have not as yet attempted to enforce it. Alabama has no special law regulating buses and trucks but under the authority of the general common carrier law, the Public Service Commission has the power to regulate passenger carriers when operating in competition with street railways. The states of Delaware, Florida, Missouri, New Mexico and Texas have no laws for regulation whatever. In Nebraska an order issued in 1919 affecting rates and classification of property was rescinded in 1921 and the railway commission has not since exercised control in any direction except to require buses to carry liability insurance.

#### Digest of State Laws

According to the Motor Vehicle Conference Committee, the nature and scope of regulatory laws of the 39 states which regulate their buses and trucks may be outlined as follows:

ARIZONA.—The Corporation Commission exercises general control over the granting of certificates; fixing of rates, fares, schedules and classification; regulating service and safety of operation; and requiring reports and other data, these applying to both passenger and property carriers

ARKANSAS.—The Railroad Commission controls the granting of certificates; fixing of fares, schedules and classifications; regulation of service and safety of operation; and the requiring of reports and other data from both passenger and property carriers.

CALIFORNIA.—Both passenger and property carriers are regulated by the Railroad Commission, which controls the granting of certificates; prescribes the service of extensions thereof; fixes rates and fares; supervises fiscal affairs; authorizes the sale or lease of certificates; and issues permits for trailers used.

COLORADO.—The Public Utilities Commission controls both passenger and property carriers and has wide control over the issuance of certificates, service, rates and fares, and safety and convenience of operation.

CONNECTICUT.—The Public Utilities Commission regulates passenger carriers only, controlling the granting of certificates and prescribing the rules and regulations with respect to routes, rates, fares, speed, schedules, continuity of service and convenience and

IDAHO.—Both passenger and property carriers come under the control of the Department of Law Enforcement which controls the granting of permits and has general charge of the administration and enforcement of the law governing these carriers, with the right to inspect their books.

ILLINOIS.—The Commerce Commission exercises control over both passenger and property carriers, with the right to grant certificates; regulate fares, service, contracts, practices, accounts, and to exercise general regulatory authority over schedules, operation and safety.

INDIANA.—The Public Service Commission controls both passenger and property carriers; issues certificates and regulates rates, service, contracts, issuance of stocks and bonds, etc.

Iowa.—Both passenger and property carriers are controlled by the Board of Railroad Commissioners which issues or refuses certificates; prescribes rules and regulations of operation; supervises accounts; fixes rates and charges; requires monthly reports of ton miles operated, and prescribes safety rules.

Kansas.—Both passenger and property carriers come under the jurisdiction of the Public Service Commission which controls the granting of certificates; fixes rates, fares, charges and classifications; regulates and supervises accounts, schedules, service and methods of operation; requires annual reports and other data, and prescribes rules and regulations.

#### Passenger Carriers Only Controlled in Kentucky

KENTUCKY.—Only passenger carriers are controlled by the Commissioner of Motor Transportation, who grants certificates; fixes rates and classifications; requires the filing of annual reports and other data; regulates service and safety of operation; holds hearings and makes any necessary rules and regulations.

LOUISIANA.—The Public Service Commission con-

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trols both passenger and property carriers. It issues certificates; regulates operation; fixes classifications and rates, and requires the filing of reports and data.

MAINE.—The Public Utilities Commission exercises control over passenger carriers only, issuing certificates; requiring reports showing miles operated, passengers carried, number of trips, receipts and operating expenses; making rules and regulations governing operation; fixing fares, routes and schedules, and investigating accidents.

MARYLAND.--Both passenger and property carriers come under the control of the Public Service Commission which issues annual permits; makes rules and regulations governing operation; fixes rates, fares and schedules, and provides for the safety and convenience of the

traveling and shipping public.

Massachusetts.—Control over passenger carriers only is vested in the Department of Public Utilities, which issues certificates; regulates fares; issues rules and regulations; hears appeals on refusals by towns and cities to issue licenses; and after hearing may amend the rules and regulations established by the town and cities.

MICHIGAN.—The Public Utilities Commission controls both passenger and property carriers; prescribes rules and regulations governing operation; issues certifi-

cates, and fixes routes and rates.

MINNESOTA.—Control over both passenger and property carriers is exercised by the Railroad and Warehouse Commission which issues certificates; fixes rates, fares and classifications; regulates facilities, accounts, service and safety of operation; requires proper safety devices, suitable waiting rooms and the filing of schedules and tariffs; supervises all matters affecting the relationship between shippers and transportation companies, and prescribes general rules and regulations.

MISSISSIPPI.—The Railroad Commission controls both passenger and property carriers to the extent of issuing certificates; fixing rates, fares, charges and classifications; requiring the filing of schedules, tariffs and reports, and generaly supervising business and operations.

Montana.—Both passenger and property carriers come under the regulation of the Railroad Commission, which issues certificates; supervises operations; prescribes equitable fares and charges; examines reports and statements, and regulates facilities, service and safety of operation.

NEVADA.-The Public Service Commission controls both passenger and property carriers, and grants certificates; regulates fares, rates, schedules and classifications; examines records; prescribes service; orders improvements and additions; holds hearing and investigations,

and makes and enforces rules and regulations.

New Hampshire.—The Public Service Commission exercises control over passenger carriers only, issuing certificates and establishing reasonable rules and regulations governing operation.

#### Wide Powers Held by New Jersey Commission

New Jersey.—Passenger carriers only are controlled by the Board of Public Utility Commissioners, which has general supervision over rates, fares, schedules and service; requires that property and equipment be kept in proper conditions; and requires a system of accounts, annual reports, and notice of accidents and increases in rates

NEW YORK.-The Public Service Commission has jurisdiction only over passenger carriers, and issues certificates; has general jurisdiction over rates, fares, charges, schedules, service and capitalization, and requires reports and a uniform accounting system.

NORTH CAROLINA.—Both passenger and property

carriers come under the control of the Corporation Commission, which holds hearings; issues certificates; fixes rates, fares, charges and classifications; and has broad powers to supervise and regulate, fix speed limits, regulate accounts, service and safety of operation; require re-ports, and regulate all matters affecting the relationship between the carriers and the public.

NORTH DAKOTA.-Control over both passenger and property carriers is exercised by the Board of Railroad Commissioners which holds hearings; issues certificates; fixes rates, fares, charges, classifications; rules and regulations; supervises and regulates operation with respect to safety; requires reports, the filing of schedules,

tariffs, etc.; and makes rules and regulations.
Оню.—The Public Utilities Commission regulates both passenger and property carriers, granting certifi-cates, fixing reasonable rates, fares, charges and schedules; requiring reports and uniform accounting systems; allowing the transfer of certificates, and exercising a general supervisory authority.

OKLAHOMA.—The Corporation Commission issues certificates and has general supervision over the regulation of rates, fares, schedules and service of both passen-

ger and property carriers.

#### New Oregon Law Sweeping in Scope

Oregon.—Both passenger and property carriers come under the jurisdiction of the Public Service Commission, which issues certificates; has supervisory and regulatory powers in all matters affecting the relationship of carriers with the public; fixes rates, fares, charges and service facilities, and supervises and regulates accounts

PENNSYLVANIA.—The Public Service Commission exercises control over both passenger and property carriers, issuing certificates; regulating fares, rates, schedules, equipment and services; examining accounts and records; and requiring reports and uniform accounting

RHODE ISLAND.—Passenger carriers only come under the jurisdiction of the Public Utilities Commission, which issues certificates and prescribes rules and regulations regarding routes, fares, speed and continuity of service, and watches over the convenience and safety of passengers generally.

SOUTH CAROLINA.—Control over both passenger and property carriers is vested in the Highway Commission, which holds hearings; issues certificates; fixes rates, fares, charges and classifications; regulates schedules and has general supervisory or regulatory powers.

South Dakota.-The Board of Railroad Commissioners issues certificates, makes safety rules and regulations; requires a uniform system of accounts; receives and examines quarterly reports; prevents discrimination; and fixes rates, fares, charges and classifications of both passenger and property carriers.

UTAH.—Control of both passenger and property carriers is exercised by the Public Utilities Commission, which holds hearings; issues certificates; fixes rates, fares, charges and classifications; regulates practices, facilities and methods; establishes uniform accounting systems, and makes investigations and requires reports.

Vermont.—The Public Service Commission regu-

lates both passenger and property carriers, having general supervision and jurisdiction over the issuance of certificates. It establishes reasonable rules and regulations; holds hearings and requires the filing of schedules, rates and charges.

VIRGINIA.—The State Corporation Commission controls both passenger and property carriers issuing certifi-

cates and having general power to regulate.

Washington.—The control over both passenger and property carriers is held by the Department of Public Works, which issues certificates; fixes rates, fares, charges, classifications and regulations; prescribes equipment and service; regulates accounts, and requires reports.

WEST VIRGINIA.—The Road Commission exercises control over both passenger and property carriers, and issues certificates; makes rules and regulations governing the operation of vehicles; prescribes routes, schedules and fares, and requires reports and information.

ules and fares, and requires reports and information.
Wisconsin.—The Railroad Commission holds hearings; issues certificates; determines rates, fares, schedules, routes and service, and has other necessary regulatory authority over both passenger and property carriers.

WYOMING.—The Public Service Commission controls both passenger and property carriers; issues certificates; fixes rates and fares; acts as arbitrator; requires reports and has other general powers to regulate and supervise.

#### Indemnity Bonds and Liability Insurance

The filing of indemnity bonds or liability insurance is a pre-requisite to the operation of common carrier buses and trucks in the following states: Arizona, Arkansas, Connecticut, Idaho, Illinois, Indiana, Iowa, Kassas, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Montana, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Utah, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

The size of the bonds required varies widely in

The size of the bonds required varies widely in amount, and in some states is not fixed but is left to the jurisdiction of the regulatory commission.

#### Northland Does Large Charter Bus Business

BUS companies, in general, make a feature of chartering their buses to special parties. This has been found profitable, not only because there is a large demand for such transportation service and the rates which can be obtained are adequate for profitable operation, but also because idle equipment can frequently be put into service in this way. In fact, with some bus lines the revenue earned through chartering buses amounts to the difference between a loss and a profit.

The Northland Transportation Company, the bus operating subsidiary of the Great Northern, does a large business in chartering buses to private parties on special occasions. Last summer its buses accommodated more than 200 such parties, each one requiring from one to five buses. Its buses were hired by a large number of commercial clubs on outings, and by groups of visitors from out of town who were making inspections about the Twin Cities.

The Northland considers its charter bus business an opportunity to sell bus transportation to the best classes of people and it therefore furnishes the finest equipment available to its parties. In transporting such special parties as football and baseball teams, however, it provides somewhat less fine equipment since there is less demand for the luxury of the more completely equipped buses. By reason of the fact that it makes it a rule to furnish the best equipment available to special parties, the Northland has been unable to press much of its surplus equipment into such service.

#### Charter Business Advertised Extensively

The Northland solicits its charter bus business actively. No special passenger agents are retained for this purpose but advertisements are published in the Minneapolis and St. Paul newspapers, and folders advertising the charter service are distributed widely. Advertising is also carried in special programs or house organs.

The charges for the charter buses are fixed on a mileage basis and these are collected in advance usually, unless the parties are well known. Charges for transporting athletic teams and other such organizations are always required to be paid in advance.

always required to be paid in advance.

The charter buses of the Northland will go almost anywhere to pick up and deliver parties. Many of its parties cover itineraries 150 miles or more in length. One party last summer covered over 500 miles and another a 700-mile routing. Parties making only a one-way journey are charged the regular mileage rate to the destination and a dead-head charge for the return trip.

#### Rates Fixed by Commission

The charter party and excursion rates charged by the Northland and other auto transportation companies in



A Wilcox Bus of the Type Furnished by the Northland to Charter Parties

Minnesota are fixed by the Railroad and Warehouse Commission of that state. For charter parties the following rates per vehicle, for the total miles traveled in the actual carrying of the chartering party, regardless of the size of the vehicle, are charged: twenty passengers or less, 30 cents per mile; 21 passengers or more, 40 cents per mile; deadhead mileage, 25 cents per mile.

Under the rules of the commission, where a chartering party requires the holding of vehicles, waiting time is charged for after the first three hours at the rate of \$3 per hour, in cases where, during the period of 24 hours from the starting time, more than 40 miles and less than 150 miles are traveled and where the mileage charge does not exceed \$75. When trips are made on a mileage basis contract, if the total miles traveled during 24 hours after leaving time do not exceed 40 miles, a minimum charge of \$40 is made in each case. The charge per bus on an hourly basis is \$10 for the first hour and \$6 for each hour thereafter. A minimum charge of \$10 is made for local short trips. Excursion rates are fixed upon a basis of five cents per passenger mile, with a minimum individual charge of ten cents. W. J. Kay, assistant general manager of the Northland Transportation Company, has charge of the chartering of its buses.



Cutaway View of a Bus Body Showing Construction Features

# Rules for Maintaining Bus Bodies

Paint, doors, hinges, windows, body bolts, and other parts need constant care to preserve good appearance and operation

By E. J. Lang
Vice-President and General Manager, The Lang Body Company, Cleveland, Ohio

HE body of the bus is created by able mechanics who take a keen interest and pride in the body they produce, building with the utmost accuracy and thorough workmanship. But even so they cannot build a body that will permanently resist the elements and the natural wear and tear it receives in operation.

The care, maintenance and service of bodies is frequently most remote in the bus operator's mind during the early operations of his bus equipment. His constant attention in the line of service has been to the chassis, the motor, etc., but rarely to the body.

Manufacturers of bus body equipment have found a great lack of understanding in regard to the care and service of bus body equipment. A few simple rules and regulations as to the care of bus bodies have been found of great use and importance to all bus operators. If these rules and regulations are followed, body troubles will be reduced to a minimum and longer life insured. Buses, like one's own personal appearance and condition, mean everything in selling transportation.

#### Use Same Care with Body as with Chassis

To insure satisfactory performance of a motor passenger carrying vehicle, the same care should be exercised in the upkeep of the body as is used on the chassis. Buses must operate under all road and weather conditions, regardless of whether these conditions are favorable to the longevity of the vehicle or not.

The bus-riding public is rapidly being educated to demand the very best in traveling comfort, and is not tolerant of squeaks, rumbles and other annoyances, indicative of a bus that has not had proper care.

Too much emphasis cannot be placed upon the care of the finish of the body. A well finished body cannot help but attract patronage. Needless to say, a body with a finish that has been ruined by neglect or carelessness cannot help but repel. The observance of a few simple rules will add greatly to keeping a bus bright and glossy.

#### Paint

Remove all dust and grit with a stream of water applied as nearly parallel to the sides of the body as possible. The water should never be applied at a high pressure, as this will enable the dust particles to mar the finish. Sponge and chamois must be kept scrupulously clean and free from grit. Avoid the use of all soaps and polishes; all are injurious to paint.

As a polisher and cleaner, use one part kerosene well mixed in three parts of water. This solution must be splashed on panels—never rubbed on—then washed off with a sponge, using plenty of clean water. Tar should be removed by applying pure lard over affected spots and allowing it to stand over night, cleaning the next morning with a kerosene and water solution by same method as that mentioned above.

Bolts securing the body to the frame should be examined at least once a week and all slack taken up. This will eliminate most of the noises and rumbles encountered in a heavy vehicle, and will also add materially to the useful life of the body.

All parts of the heating unit underneath body, such as heater pipes, flexible tubing and so forth, should be kept free from corrosion.

The spring bumpers, especially in the rear of the body, are subjected to the most severe strain and vibration and if not kept properly tightened, will soon be found in bad condition. All joints in the bumpers should be well oiled. Rubber door silencers play an important part in the satisfactory performance of the body doors. Care should be taken that these rubbers are extended out from their container sufficiently to take up all vibration of the door when the vehicle is in motion.

The dovetails, whose function is to prevent up and Class II and III Roads Reply down movement of the door, should be well lubricated. Care should be taken, however, to use as little grease or oil as possible on these units, so as not to soil the clothing of passengers entering and leaving the bus.

The lock bolts should be lubricated to insure easy working of the doors and to prevent excessive wear on the striker plates. Door hinges should at all times be kept

Striker plates should be examined frequently for evidence of undue wear and should be replaced when necessary. Upon removal of striker plates all wood screw holes should be plugged with hardwood plugs, which have been dipped in glue.

Panels should be removed about four times a year in order to examine the window regulators. Springs and counterbalance arms should be well oiled, because of the fact that they are apt to become corroded by moisture seeping through the walls of the body. Woodwork should be well painted.

#### Refinishing

No definite time can be set for refinishing a vehicle in order to preserve the finish, as this depends upon the care and the usage of the vehicle. After the ordinary passenger car has been used six or seven months, it is advisable to give it a light pumice rub and a clear coat of finishing varnish. This preserves the color and gen-eral finish and always keeps it looking like new. This operation, performed in time, saves the larger cost involved in an entirely repainting and refinishing job. This is merely a suggestion for those who are interested in keeping their equipment looking fresh at all times.

Suitable forms upon which bus drivers can note items needing attention, to be turned over to the maintenance department at the termination of the day's service, are distinctly helpful. This report should be designed so as to make it possible for the operator to check off such items as broken windows, broken chairs, torn cushions, leaky heater pipes and so on. These will not only speed up the maintenance work but also minimize the likelihood of any defects being overlooked by the inspector.



A Mack on the New England

# to I.C.C. Questionnaire

WENTY motor buses and three trucks are operated by Class II and Class III steam railways in terminal or line service, according to the statistical summary of answers made by such roads to its questionnaire on bus and truck operation which has been issued by the Interstate Commerce Commission. questionnaire was sent to all railways when, on May 1, 1926, the commission entered upon an investigation on its own motion into and concerning the general question of the operation of motor buses and trucks by, in connection or in competition with common carriers subject to the Interstate Commerce Act. The replies of Class I railways to the commission's questionnaire were tabulated by the commission late last year and were reported in the Motor Transport Section of January 22, 1927.

Returns were received in time for inclusion in the present summary from 377 out of 635 steam railways in Classes II and III. As in the case of Class I railways the returns of the short lines were more or less incomplete owing to the inability of some of the roads to obtain detailed information.

Class II and III railways throughout the country reported that they own 23 motor buses and that none are owned by them through subsidiaries. Two buses were reported as operated in terminal service by the railways and nine in line service by subsidiaries.

Class II and III railways in the New England, Central Eastern, Pocahontas and Northwestern regions are not engaged in the operation of motor buses, according to their replies. In the Great Lakes region, the Middle-town & Unionville reported one motor bus operated in line service with a bus route of 14 miles. In the Southern region, two motor buses were reported by the Cadiz Railroad as being operated in terminal service, and one operated by the Tennessee & North Carolina in line service with a bus route of 21 miles.

In the Central Western region, five motor buses were reported as being operated in line service, one by the Yreka Railroad, one by the Amador Central, two by the Pajaro Valley, and one by the San Luis Central, with a total bus route of 29 miles. In the Southwestern region two motor buses were reported as being operated in line service, one by the Graysonia, Nashville & Ashdown, and one by the Paris & Mt. Pleasant, with a total bus route of 79 miles.

The short line railways in the New England, Central Eastern, Pocahontas, Southern and Southwestern regions reported that they were not engaged in the operation of motor buses through subsidiaries. A subsidiary of the Fonda, Johnstown & Gloversville was reported as operating one bus in the Great Lakes region, with a bus route of 86 miles. In the northwestern region, four motor buses were reported as operated by a subsidiary of the Copper Range, with a bus route of 82 miles. In the Central Western region, a subsidiary of the San Joaquin & Eastern operates four motor buses with a bus route of 11 miles.

#### **Extensive Competition**

Short line railways in the New England region reported two motor buses operated by independent companies in connection with their operations in terminal service and nine buses operated in competition with them in line service over an agregate bus route mileage of 200 miles. In the Great Lakes region, one bus was reported as operated in terminal service in connection with a railway and 24 buses were reported as operated in competition with railways over 304 route miles.

In the Central Eastern regoin, 60 buses are operated by competitors over aggregate routes of 1,224 miles. In the Pocahontas region, 18 buses were reported as competing with the railways over routes aggregating 239 miles in length. One railway in the Southern region reported two buses operated in connection with it in terminal service, while 80 buses were reported as in competition with the railways in line service over 1,293 miles of route.

Short lines in the Northwestern region reported 33 buses operating in competition with them over routes aggregating 692 miles in length. In the Central Western region, 48 buses, with total route mileages of 398, were reported as in operation in connection with the railways, while 293 buses were reported as operating in competition with them over 3,214 miles of route. Short lines in the Southwestern region reported 14 buses operating in connection with them in terminal service and

67 buses operating in competition with them in line service covering 2,176 miles of route.

Few Short Lines Operating Trucks

Only one motor truck was reported as being owned by a short line railroad. With respect to trucks operated, one was reported as being operated in terminal service by a railroad and two in line service by a subsidiary. The one truck operated in terminal service was reported by the Bristol Railroad in the New England region, roads in the Great Lakes, Central Eastern, Pocahontas, Southern, Northwestern, Central Western and Southwestern regions replying that they were not engaged in the operation of motor trucks either in terminal or line service. In the Central Western region, two motor trucks were reported as operated by a subsidiary of the San Joaquin & Eastern, with a route mileage of 11 miles, no trucks being operated by subsidiaries of short lines in the New England, Great Lakes, Central Eastern, Pocahontas, Southern, Northwestern and Southwestern regions.

Trucks Operated by Independents

Thirteen trucks were reported by the short lines as being operated by motor transport companies and individuals in terminal service and 545 trucks by such companies in line service, these latter having an aggregate truck route mileage of 9,134.

In the New England region, one truck was reported as being operated in connection with a railway in line service, while 32 trucks were reported as being operated in competition with the railways over 476 miles of

routes.

In the Great Lakes region, one truck in terminal service and three in line service, with a route mileage of 40 miles, operate in connection with the railways, while 54 trucks with 336 miles of routes operate in competition with them

In the Central Eastern region, the short lines reported 203 trucks operating in competition with them in line service, with aggreate route mileages of 1,596. Short lines in the Southern region reported eight trucks operated in connection with them in terminal service and one truck in line service, while they reported 32 trucks operated in competition with them in line service, over 502 miles of route.

Two trucks with route mileages totaling 74 miles were reported as operating in connection with short lines in the Northwestern region, and 23 trucks, with aggregate route mileages of 441, were reported as operating in competition with the railways. In the Central Western region, 33 trucks, with aggregate route mileages of 984.

operate in connection with short line railways, while 60 trucks operating over 2,233 miles of routes compete with them. In the Southwestern region the short lines reported four trucks operated in connection with them in terminal service and 101 trucks operating in line service in competition with them, these latter having an aggregate route mileage of 2,444.

Electric Railways' Report

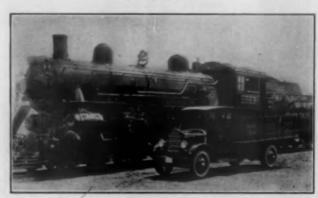
Electric railways coming under the jurisdiction of the Interstate Commerce Commission reported ownership of 255 buses with an additional 75 owned by their subsidiaries. Electric lines reported that they operate 591 buses in terminal service and 756 in line service. A number of the 118 electric railways whose replies were included in the commission's summary are subsidiaries of steam railways.

#### A Wheel for Heavy Buses and Trucks

In design, the Budd dual wheel, manufactured by the Budd Wheel Company, Detroit, Mich., remains the same as heretofore, with some minor improvements in the parts that make up the complete assembly. The major improvement is what is termed the double cap nut method of mounting dual rear wheels. The original method of mounting was by a single nut through which both the inner and outer wheels were driven. By this design the inner wheel of a dual assembly was in reality driven by the friction or clamp action between the outer wheel and the hub flange. With the double cap nut method of driving, each of the dual rear wheels is driven by an individual set of nuts. The need for such a method of mounting and driving dual wheels became evident with the advent of the larger and heavier buses, requiring up to 7 in, and 8 in, size tires to carry the load.

The principle of the Budd driving wheels remains unchanged from the original design. The wheel stud holes are larger than the studs themselves, and, furthermore, are counterbored cup shape. Into the counterbore fits the ball face of the cap nut. This design provides the nut with a large area of contact against the wheel. Right and left hand studs applied on the opposite sides of the vehicle contribute to keeping the nuts tight after they have been properly drawn up. Elimination of worn holes and sheared or broken studs, is said to have been effected by this type of mounting. The disc and the rim of the dual wheel are integral which insures easy handl-

ing and a true running wheel.



A Reo Speedwagon in the Service of the Grand Trunk Stores Department

### Motor Transport News

A BILL providing for the regulation by the Public Utilities Board of motor buses and trucks has been introduced in the legislature of Alberta. The board would be empowered to issue licenses, fix fees, classify such vehicles by weight and fix maximum weights, as well as to control rates for transportation by bus and truck.

Another Contract for motor truck service in replacement of peddler train service for the handling of l.c.l. freight has been made by the Pennsylvania with a local truck operator. This truck line extends from Corliss, Pa., via Carnegie to Burgettstown, a distance of approximately 25 miles. It is the fourteenth truck route to be established on the Central region and the fortieth on the entire system.

AN ADDITIONAL ROUTE via railway train and motor bus will be provided to Yellowstone National Park this summer as the result of a contract made by the Chicago & North Western with the Lander Yellowstone Transportation. Through rates for transportation to the park via the Lander gateway will be offered by the North Western. The motor bus journey from Lander to the park will cover approximately 160 miles, and will traverse a region of scenic grandeur.

A BILL providing for the regulation of bus and truck lines in the state by the Railroad Commission of Texas has been passed by both houses of the legislature and is now awaiting the signature of the governor. The commission is empowered to grant certificates of permission to operate to companies which make a proper showing as to insurance, equipment and responsibility. The bill prohibits the commission from refusing to grant certificates solely on the grounds that the highway service would compete with railroad service.

#### Interstate Driver Not Required to Have City Driver's License

The Supreme Court of the State of Washington holds that a city ordinance requiring the licensing of drivers of automobiles for hire does not apply to the driver of a motorbus or auto stage running exclusively between the city and a city in another state, as this would be under the ruling in Buck v. Kaykendall, 267 U. S. 308, an interference with interstate commerce. International Motor Transit Co. v. City of Seattle (Wash.), 251 Pac. 120.

#### Pennsylvania Contracts for Bus Service

The Pennsylvania has transferred the certificate and sold the equipment used on its Chambersburg, Pa.-Piney Mountain Inn bus line, formerly operated in the name of F. J. Scarr, supervisor motor service, to Scott Bros., Inc., Philadelphia, Pa. The operation, of the line., will be continued by Scott Bros. for the Pennsylvania, under a contract.

Another contract bus line has been placed in service by the Pennsylvania paralleling its Manor branch, extending from Manor, Pa., via Claridge to Boquet, a distance of approximately 7 miles. Scott Bros., Inc., is handling this operation also for the Pennsylvania, one White motor bus being used. Passenger train service on the Manor branch has been discontinued and passenger tariffs extending beyond Manor to towns on the branch line have been cancelled. Operation on this line began on March 8.

#### Wabash Replaces Trap Cars with Tractors and Trailers in Chicago Terminal

Two tractors and 7 trailers were placed in service by the Wabash on March 1 to eliminate trap car service between its Polk street station in downtown Chicago and its 49th street station. The tractors are kept in continuous operation between these stations throughout the day, daily except Sunday, making approximately 11 pick-ups of trailers at each station. One additional pick-up is made at the Englewood station daily.

The equipment used includes two ten-ton tractors, one a

G. M. C. model, manufactured by the Yellow Truck & Coach Manufacturing Company, Chicago, and the other manufactured by the International Harvester Company, Chicago. The operation of the equipment is carried on by the Arthur Dixon Transfer Company, under contract with the Wabash.

#### Ohio Bus and Truck

#### Legislation Opposed by Railways

Two bills are now pending in the legislature of Ohio which, if enacted into law, would limit the power of the Public Service Commission to regulate bus and truck lines in the state. Both bills are being opposed by the railways, and it is expected that neither will pass in its present form. The newspapers in the state have strongly opposed the bills. One of the bills would empower bus lines to change the schedules and fares by notifying the commission as to the action taken but without seeking its approval. Local service might be restricted or eliminated in the same way. Consolidations might be carried out with equal ease.

The other bill would permit "irregular" bus and truck operation, on any routes between any points, and rates would be likewise left to the discretion of the transportation company.

#### Vermont Court Says State May Tax Interstate Buses

The Vermont Supreme Court holds that the provision of the State Motor Vehicle Act for taxing motor buses of nonresidents making more than 30 regular trips during the current year on the state highways is not unconstitutional as being in violation of the interstate commerce clause. State v. Caplan (Vt.), 135 Atl. 705.

The court said: "While a state may not require a private carrier engaged in interstate commerce to become a public carrier, and while it is well established by Buck v. Kuykendall, 267 U. S. 237, and Bush v. Maloy, 267 U. S. 317, that a state cannot drive interstate commerce from its highways simply because, in its opinion, the public good does not require it, or because existing transportation lines would be prejudiced by it, it is well established that a state may exact a reasonable excise tax for the use of its highways by motor vehicles engaged in interstate commerce.

#### Coast Bus Lines Cut Rates

Bus lines operating between San Francisco, Cal., Portland, Ore., and Seattle, Wash., have recently reduced their rates by about one-third. The rate from San Francisco to Portland which formerly prevailed was \$16.50, while the rate from San Francisco to Seattle was \$21. These have been reduced by three of the companies, the Bell, the Pickwick and the Pennant, to \$12.50 for the San Francisco-Portland trip and \$16.50 for the San Francisco-Seattle journey. When these rates were put into effect the Tri-State line lowered its fares to \$11 and \$14, respectively.

According to some of the bus lines the reduced rates will be in effect only during March when tourist business is at a low ebb, but the Tri-State line has indicated that its lower rates will be made permanent. The action of the Southern Pacific in announcing a \$15-excursion rate from San Francisco to Portland is considered to have caused the reduction of the bus line fares.

### Oklahoma Supreme Court Denies Bus Route Application, Public Convenience Not Shown

The Oklahoma Supreme Court, on appeal by the Chicago, Rock Island & Pacific, has reversed an order of the Oklahoma Corporation Commission granting a certificate of convenience and necessity to operate a bus line between Chickasha and Waurika, for the reason that "the public has not spoken on the question of its convenience and necessity in this case, neither has applicant shown that the public demands the installation of this additional service from station to station, already served by protestant, nor has he shown that the service of protestant is inadequate and inconvenient, or that the proposed service by his bus line would eliminate public inadequacy and inconvenience, if such existed; there is no competent evidence to support the order directing the issuance of a certificate of public convenience and necessity."

The court approved of the holding of the Illinois Supreme Court in Choate v. Illinois Commerce Commission, 309 Ill. 248, that the fact that a proposed bus line serving the same territory as an established interurban line may accommodate a few individuals does not justify a certificate permitting it to operate; the convenience and the necessity which the law requires being the convenience and necessity of the public, as distinguished from that of an individual or any number of individuals.

#### Ohio Supreme Court on Transfers of Bus Certificates

Nine decisions involving transfers of certificates permitting the operation of bus lines in Ohio, which were appealed from the approving decisions of the Ohio Public Utilities Commission by the Pennsylvania, were reversed by the Ohio Supreme Court in a unanimous verdict handed down on March 2. In addition to affecting the transfer of such certificates from one company to another, the decision will be prejudicial to the establishment of through rates and schedules by connecting bus lines. The decision is in conformity with the original law regulating common carriers as interpreted by the Supreme Court, which holds that bus transportation is an auxiliary service to be regarded as supplementary to existing railway service and to be kept out of competition with it.

With respect to the establishment of through service by two or more connecting lines the court's decision reads:

"An application to amend the tariff and schedule of one or each of two certified motor transportation routes authorized to be operated as separate routes so as to convert the service of such routes from local service between their respective termini to a through service between the outside termini of the two routes is, in effect, an application for a new route, and must be made under Section 614-91 general code and publication must be made and notices served as provided in that section. Before an order can issue granting such service the Public Utilities Commission must find that the public convenience and necessity

With respect to the transfer of certificates the court held that it is an abuse of discretion for the Public Utilities Commission to authorize the transfer of certificates to those who do not possess the qualifications of the original certificate holder. The recipient of a certificate, it is held, does not acquire any property right in the highways and the certificate does not add to his capital assets.

The certificate neither is property nor a business, and good will does not attach to it. The holder is not entitled to credit his capital assets with any sum for good will or going concern. The court held also that when an applicant to whom a transfer is to be made has to include good-will or going concern value to make a showing of solvency, the commission should with-

hold its consent to the transfer.

One case involved in the decision, which was typical of the others, was the transfer of the certificates of an operator between Columbus, Ohio, and Blanchester and between Blanchester and Cincinnati. This operator sold the certificates to the Buckeye Service Company after rearranging his schedules to give continuous service between Columbus and Cincinnati. Formerly there had been a wait of one hour at Blanchester between buses operating on these routes in both directions. The Pennsylvania attacked this arrangement as "insidious" and seeking to do indirectly what wight out he done directly.

directly what might not be done directly.

The Pennsylvania charged an "evident intent" on the part of the Buckeye Company "to consolidate the separate lines which obviously will enable the Buckeye to furnish through motor bus service between Columbus and Cincinnati and between Columbus and Cleveland." This new service between Cleveland and Cincinnati, it was claimed, "would bring the new holder of certificates into direct competition with the railroad company, to its prejudice." According to reports, the commission acted upon the certificate transfers without holding hearings.

#### Among the Manufacturers

O. S. Tweedy, who was formerly connected with the branch sales department of the United States Tire Company, has been appointed manager of the branch sales of the Ajax Rubber Company, Inc., New York.

Price reductions on two light delivery motor truck models have been announced by the White Company, Cleveland, Ohio. Model 15, with three-quarter ton and one-ton capacity, has been reduced \$605, from \$2,150 to \$1,545, and model 20, with

one and one-half ton capacity, has been reduced \$825, from \$2,950 to \$2,125.

#### Motor Transport Officers

G. F. Dell, a member of the staff of the general superintendent of transportation of the Central Region of the Pennsylvania, assigned to the preparation of studies regarding the replacement of train service by bus or truck service, has resigned to become superintendent of engineering and traffic of Scott Bros., Inc., Philadelphia, Pa. He will have duties of a similar nature in his new position, Scott Bros. holding several contracts with the Pennsylvania for the provision of truck and motor bus service.

F. J. Scarr, supervisor of motor service of the Pennsylvania, with headquarters at Philadelphia, will resign, effective April 1, to establish the Scarr Transportation Service, with



F. J. Scarr

headquarters at York. This organization will provide a consulting engineering service on railway and highway transportation for steam railroads, electric railways and bus and truck operators. Mr. Scarr was born at Mulhall, Okla., on November 23, 1894. He was educated in the public schools at Helena, Mont., Sacramento, Cal., Tampa, Fla., and Hasbrouck Heights and Hackensack, N. J., and was graduated from Rutgers College with the class of 1917, at which latter institu-

tion he took the civil engineering course, specializing in railway economics. At the outbreak of the war he entered the officers training camp at Fort Myer and was com-missioned a second lieutenant. A short time thereafter he was advanced to the rank of first lieutenant and in the spring of 1918 was appointed aide to the major general in command of the Thirty-seventh division, in which capacity he went overseas. In August of the same year he was promoted to captain in command of a machine gun company, with which he saw considerable action. He was severely wounded in action on the October 31 following. After resigning his commission a year later, he entered the service of the Packard Motor Car Company and remained in its service for about two years in various engineering capacities. He then entered the service of the Standard Oil Company of New Jersey as assistant superintendent of the fleet of trucks and salesmen's cars operated by that company. In the fall of 1922 he became transportation engineer for the Motor Haulage Company, New York, and served for a year, com-mencing late in 1923, as an automotive expert for the Association of Railway Executives, reviewing and reporting on the operations of the American Railway Express Company. When the Pennsylvania decided to study closely the problem of highway transportation, Mr. Scarr was engaged by the company to organize its motor service. In the capacity of supervisor of motor service he has had general supervision of highway operations of the entire system and of the special studies necessary in this connection. The first application to the public authorities for permission to operate highway vehicles in passenger service in Pennsylvania in behalf of the railroad were made by Mr. Scarr in his own name, pending final plans and arrangements as to how the railroad proposed to conduct these operations. Mr. Scarr was a leader in the organization of the Railroad Motor Transport Conference, and served as its secretary during its formative stage. He has contributed largely to the literature on the subject of the railway operation of motor vehicles both by his writings and by addresses before various engineering and technical societies.

# MINER

IDEAL SAFETY HAND BRAKE

THIS
ABSOLUTELY RELIABLE BRAKE
OPERATES SAFELY AND WITH
EASE, DEVELOPS THE REQUIRED
POWER AND PROTECTS TRAINMEN, EQUIPMENT AND LADING

W.H.MINER CHICAGO



# More Roads Are Using Grip Nuts

STATISTICS show an increasing demand for Grip Nut products.

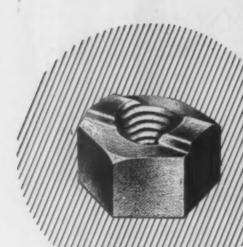
In the last three years, 1923 to 1926 inclusive, 87 new customers have been added to the list of those using the Grip Unit Nut No. 3.

In the last three years, 1923 to 1926 inclusive, 23 new customers have been added to the list of those using the Grip Locomotive Nut No. 4.

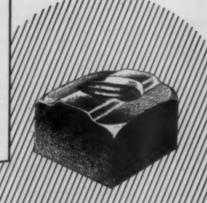
These additions to the list of customers who have used Grip Nut products as a standard practice for ten or more years are irrefutable evidence of the dependability of the Grip Nut.

> GRIP NUT COMPANY 5917 S. Western Avenue CHICAGO, ILLINOIS

# Grip Nuts



Grip Nuts are made to the A. R. A. standard specifications; they have a holding power worked into the thread during the process of manufacture that insures positive protection to all bolted parts.



**Grip Nuts Hold!** 

# DALMAN TRUCKS



40 TON



50 TON



70 TON

Modern Trucks for Modern Cars

THE American Railroad Association in 1920 ruled that freight cars could be loaded to Axle Capacity rather than the Marked Capacity. No corresponding increase in spring capacity, however, was provided. Springs go solid under such loadings, causing failures by the transmission of destructive shocks that are not absorbed.

The Dalman Truck employing standard A.R.A. coils, provides sufficient spring capacity to meet these modern conditions, relieving the car, its lading and the track from destructive shocks.

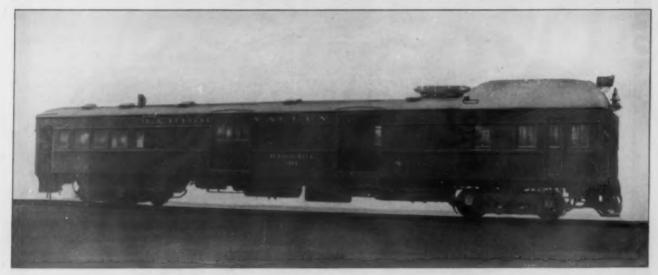
**AMERICAN STEEL FOUNDRIES** 

**NEW YORK** 

CHICAGO

ST.LOUIS





One of six double power plant gas-electric cars for the Lehigh Valley

### A larger field for the Gas-electric

During the year 1926 just passed the introduction of gas-electric cars on many roads was successfully accomplished. It has been demonstrated, particularly since the development of the Brill double power plant car for the Lehigh Valley, that the gas-electric is no longer confined to the lighter traffic service, but possesses ample power to meet the heavier trunk line service.

In the Lehigh Valley cars two

160 kw generators, operated by two 250 hp gas engines, supply electric power to four 140 hp railway motors driving both front and rear trucks.

Therefore, at the beginning of 1927 a still larger field for the gas-electric car now exists. Many more railroads can now take advantage of the convenience and economy of this type of motive power.

Complete information furnished upon request

AUTOMOTIVE CAR DIVISION

The J. G. Brill Company

Philadelphia, U. S. A.

Chicago Office: Railway Exchange Bldg.

# Get in step with 1927

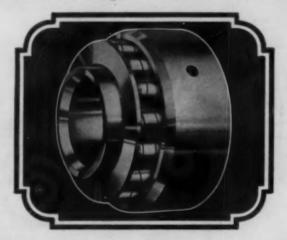
RAILROADS are "going Hyatt" because in all departments, in every respect, Hyatt holds the answer to the demands of modern service.

From the humble transmission lines in your shops, to the journals of your fastest Limited, you need Hyatt Roller Bearings.

Having specified "Hyatt", you cash in on more efficient work from trailers, trucks, gas cars, tenders, machine tools.

Hyatts will give you honest, long and capable performance under all conditions, paying appreciable returns on the initial investment.

Behind Hyatt Roller Bearings stand 36 years of bearing knowledge and the General Motors standard of quality. For better service to passengers and greater profits use Hyatt Roller Bearings.



# FROLLER BEARINGS PRODUCT OF GENERAL MOTORS

HYATT ROLLER BEARING COMPANY . . . Newark, New Jersey



### CARNEGIE STEEL COMPANY

cordial greetings
for the New Year
may Nineteen-Twenty-Seven
bring you prosperity
and success



I T isn't the actual cost of the staybolt iron that runs up the costs in your shop—it's the labor and the frequency of shopping the locomotive.

Hollow staybolts, of course, eliminate the tell-tale job and cut down labor costs. But even hollow staybolts won't reduce the frequency of repairs unless they are made of good iron—iron that will stand up in service.

Lewis Special Hollow Staybolts are made of the best iron that can be produced for Railroad Service.

Write for a few samples to test.

#### JOSEPH T. RYERSON & SON INC.

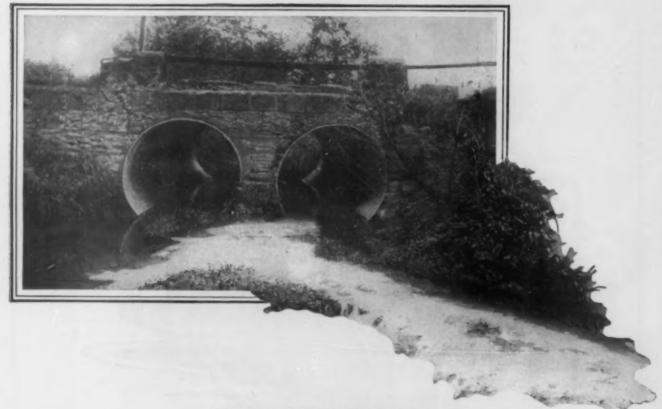
ESTABLISHED 1841

PLANTS: CHICAGO ST. LOUIS CLEVELAND NEW YORK
MILWAUKEE CINCINNATI DETROIT BUFFALO BOSTON
DEPORTS TATION IN DENVER LOUISVILLE SAN FRANCISCO JERSEY CITY

REPRESENTATION IN: DENYER LOUISVILLE SAN FRANCISCO JERSEY CITY
MINNEAPOLIS TULBA HOUSTON LOS ANGELES NEWARK

### RYPRSON RAILROAD SERVICE

# Armco quality



These ARMCO Culverts are still giving perfect service after 20 years of continuous use.



ARMCO

Consistent Performance Because

# your protection

When you buy an Armco culvert your money buys more than mere metal of a certain weight, more than a mere drainage opening of a stated size, more than a piece of pipe to meet a certain specification. Your money buys what it cannot buy in any other product-Armcoquality backed by Armco reputation and by Armco's considerate service in your interest.

#### Quality of Metal

Armco culverts are made from Armco Ingot Iron—the only commercially pure iron made. In twenty years of service under every known condition of climate and soil it has not been found necessary to add any other ingredient to the composition of this metal or to alter in any way its analysis. Its superior rust resistive qualities have earned for Armco Ingot Iron universal recognition as the Aristocrat of Culvert Materials.

#### **Consistent Uniformity**

The long life of Armco culverts is due not alone to the fact that the metal is pure; it is uniformly pure-the same composition of material year after year, installation after installation. In 95,454 analyses of Armco Ingot Iron, covering a period of seven years,

the average variation in ferrous content was less than 2/10,000. This record of consistent uniformity is unequalled in the manufacture of iron and steel.

#### **Proven Dependability**

Armco culverts have been installed in every state in the Union and in every province of Canada continuously since 1907. Nearly 2,000,000 are now in use. The service rendered throughout the past twenty years by these culverts, many of them with repeated reinstallations in new locations, has supplied unmistakable proof of Armco dependability.

#### Quality Guarded by Nation-Wide Inspection

But Armco quality is due only in part to the happy discovery of a rust resistive iron. It is due as much to the jealous care with which the performance of Armco culverts has been watched for many years. Armco engineers are constantly in the field, examining, photographing, analyzing culverts. When a culvert gives less than its expected standard of service, these engineers ask why. Soils and ground waters are analyzed, and the abrasive qualities of the stream are studied. If the conditions noted are found to be of general occurrence then Armco engineers do not rest until they have found a solution.

These investigations have served the double purpose of maintaining the supremacy of Armco quality and of assuring the culvert buyer a type of structure exactly suited to his requirements.

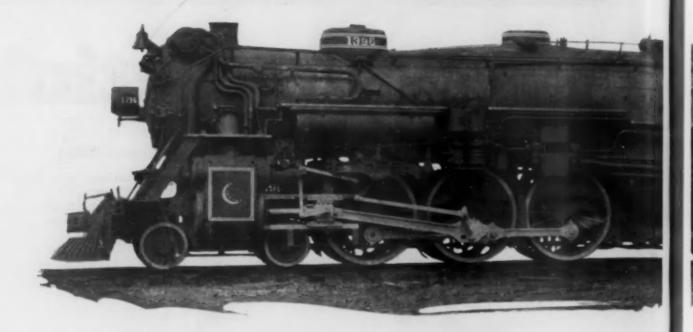


INGOT IRON

ARMCO CULVERT ASSOCIATION MIDDLETOWN, OHIO

Culverts

of Consistent Uniformity



# On the (RESC)

To further improve its service to the traveling public, the Southern Railway recently placed in service twenty-five Pacific Type locomotives.

To insure dependability and safety of operation this power was equipped with devices carefully selected for their proven merit.

#### THE SYMINGTON COMPANY

New York

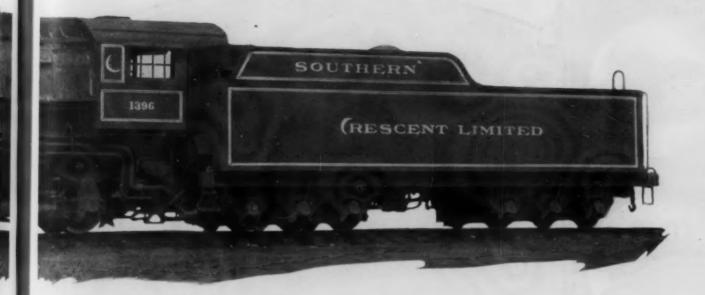
Chicago

Baltimore

Boston

Montree

WORKS: ROCHESTER, N. Y.



### ENT LIMITED

Among These Specialties are:

Farlow Draft Attachments
(Applied with Commonwealth Tender Frames)

Symington Journal Boxes
(both plain and with train control brackets)

Gould Tender Coupler A.R.A. Type "D"

Gould Pilot Coupler A.R.A. Type "D"

Gould Cast Steel Pilot Beams

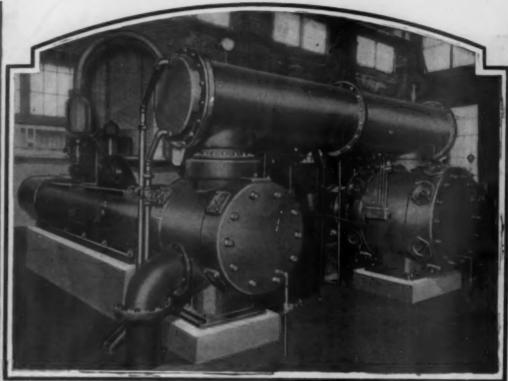
#### THE GOULD COUPLER COMPANY

New York

WORKS: DEPEW, N. Y.

Chicago





# Compressors

#### Dependable Air Supply at Low Cost

The compressor is the heart of the entire air system—every unit in the shop, roundhouse, and yard is dependent upon it. Reliability, therefore, is a big factor.

To be an asset, the air compressor must be correct in design and construction; it must deliver the required amount of compressed air at the lowest cost per cubic foot. Economy, like reliability is a vital factor. Only machines of proven worth should be installed.

Performance records prove that I-R Compressors fulfill these requirements of dependability and economy. They can be installed with positive assurance of steady operation, high efficiency, and the delivery of air power at the lowest possible cost.

Ingersoll-Rand Company offers more than a thousand different types, sizes, and styles of drive to meet your requirements. Expert engineering assistance is always at your service.

#### INGERSOLL-RAND COMPANY

11 Broadway, New York City

Offices in principal cities the world over

For Canada refer Canadian Ingersoll-Rand Co., Limited, 260 St. James St., Montreal, Quebec Atlanta Birmingham Boston Buffale Butte Chicago Cleveland Dallas Detroit Denver Duluth El Paso Hartford Houghton Joplin Knokville Los Angeles New Orleans New York Philadelphia Pittsburgh Pottsville San Francisco Salt Lake City Scranton Seattle St. Louis St. Paul Washington



# PneumaticTools

Long Life and Low Tool Room Costs

Ingersoll-Rand air tools are fast becoming the railroads' standard. They have distinctive features which prevent breakdowns, assure low maintenance costs, and make possible a high standard of locomotive and car repair work.

For instance, the drills are equipped with a centrifugal governor which saves air, minimizes wear and tear on the motor, and saves taps, drills, and reamers. The riveters have special alloy steel barrels and heat-treated handles, and there are no holes or ports in the valves to start checks or cracks. These features insure long life and low tool room costs.

In addition to compressors and pneumatic tools for all requirements, Ingersoll-Rand Company manufactures a complete line of tie tamping outfits, "Cameron" pumps, condensers, air lift pumps, rock drills, and oil engines.

Ingersoll-Rand



# "From The Ore To The

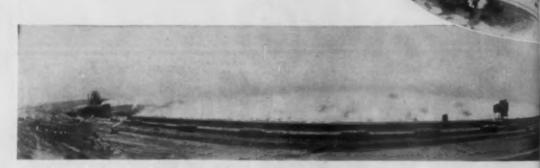
FROM the ore to the finished product is not a meaningless slogan—it is a basic factor essential to the consistency of a quality standard that only undivided responsibility in production can insure.

In every Bourne-Fuller product this centralized control of resources, men, materials and processes of manufacture symbolizes the energies of over 70 years of specialized endeavor to develop and maintain iron, steel and alloy steel of outstanding superiority.

Whether railroads buy in terms of iron or steel, or the finished forgings, bolts, nuts and rivets, the ultimate performance is identical in its relation to those worthwhile economies that come from fewer replacements because of greater service efficiency.



Staybolt



Bourne-Fuller Coke Co. (Connellaville Region)



Track Bolt



The Upson Works

Makers of "Upson" Bolts-The Result of Over 70 years' Specialization



The BOURNE CLEVELAND

# Finished Product"



Union Mills, Cleveland



ALLOY - STEEL - CARBON

BLOOMS, BILLETS, SLABS, BARS S. A. E. Standards and Special Analysis Open Hearth

"UPSON"

**BOLTS — NUTS — RIVETS** 

"CLIMAX" ALLOY

STAYBOLT STEEL - FINISHED STAYBOLTS

#### SPECIAL ALLOY STEELS

For Engine Bolts, Piston Rods, Crank Pins and Side Rods

STANDARD CARBON STEELS FOR ALL PURPOSES





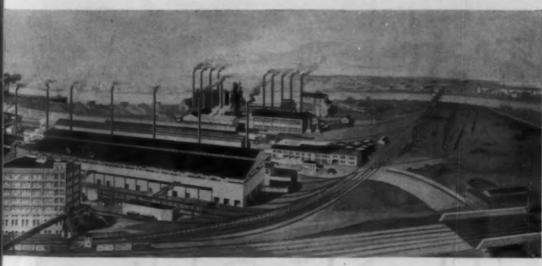
Carriage Bolt



Button or Structural Rivet



Cone Rivet



Makers of "Upson" Bolts—The Result of Over 70 years' Specialization

FULLER CO.



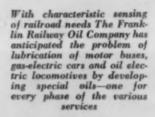
# We Serve But One Ma



THE railway field is not merely one of our markets, but our SOLE market. Every thought, every act of The Franklin Railway Oil Co. has but one goal—better lubrication service for the railroads. It is the one oil company devoted exclusively to this field.

Franklin Lubricants are not cure-alls that compromise with one lubrication problem in order to partially solve others. They are SPECIALIZED RAILWAY LUBRICANTS, formulated and compounded to meet and overcome the lubrication problems peculiar to railroad operation.

Franklin Service not only insures you the proper lubricant for every service but goes further and insures unfailingly reliable delivery when and where you want it, regardless of quantity.





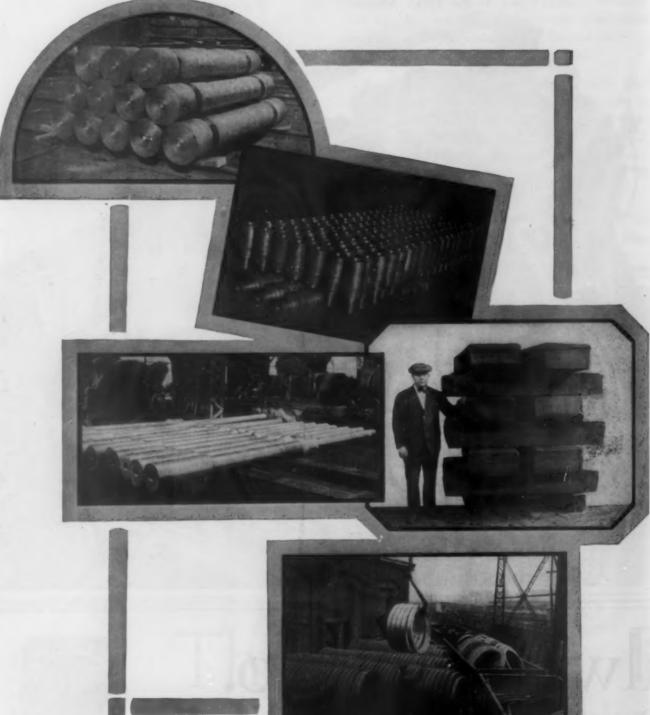
The Franklin R

# aster—The Railroads



Railway Oil Co.
Pennsylvania







# LOCOMOTIVE TIRES AXLES FORGINGS

IRON AND STEEL CASTINGS FORGING BILLETS

#### FLYER IRON

for engine bolts, and small forgings

HIGH SPEED AND CARBON TOOL STEELS

All of the above products are produced complete in our plant—affording us the opportunity of controlling the manufacture—from the casting of the heat—through the necessary treatment and the finished machining where required.

### THE MIDVALE COMPANY

DISTRICT OFFICES:

105 Broadway

PITTSBURGH Grant & 5th Ave. W.SHINGTON

CLEVELANI

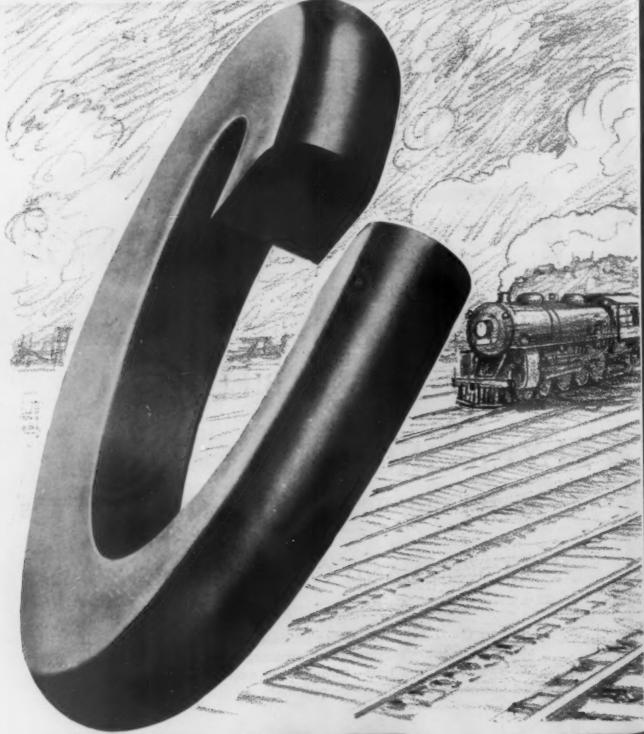
CHICAGO 832 S. Michigan Ave. SAN FRANCISCO

TOOL AND ALLOY STEEL WAREHOUSES

PHILADELPHIA

CLEVELAND

SAN FRANCISCO



# HING SPRING

# Can a Spring Washer be Too Good'?

HUNDREDS of railroads have the answer—but we will be glad to give it without the slightest obligation.

Until you investigate you will never know how much ordinary washers are costing in failure to function and how much Hy-Crome will save.

A single loose rail joint, one battered rail and its replacement cost would approximately Hy-Crome an entire division.

Hy-Crome and permanently tight rail joints mean the same thing. Railroads that buy on a basis of actual accomplishment rather than assumed results, have established this fact.

Steady increase in railway sales is conclusive evidence that the search for greater spring washer economy has lead straight to Hy-Crome.

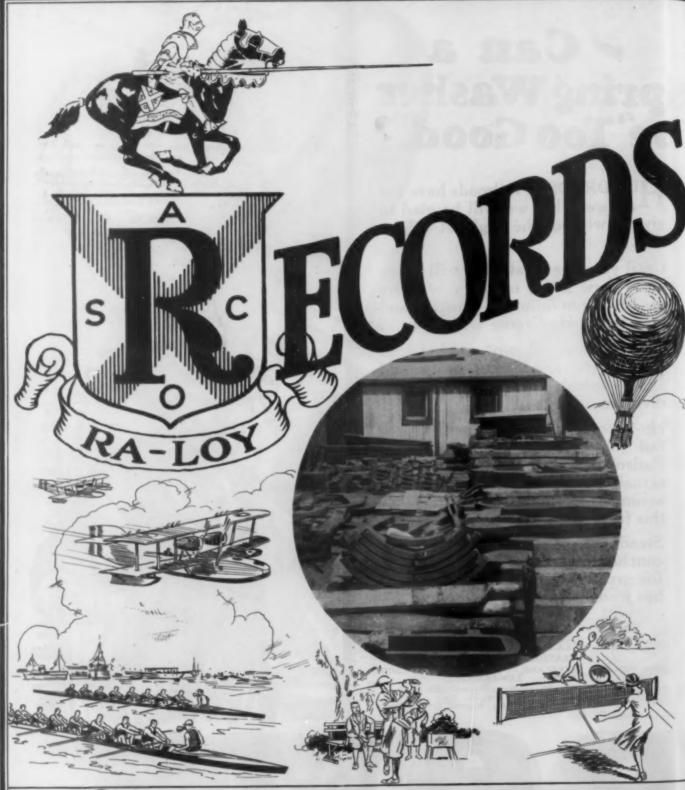
THE RELIANCE MFG. CO. MASSILLON, OHIO

NEW YORK, CLEVELAND, DETROIT, CHICAGO, ST. LOUIS, SAN FRANCISCO

N. S. Kenney, Munsey Bldg., Baltimore, Md.
W. & A. C. Semple, Louisville, Ky.
Engineering Materials, Ltd., McGill Bldg., Montreal, Quebec, Canada



ROME WASHERS



The ANDREWS
NEWPORT.

# THAT STAND

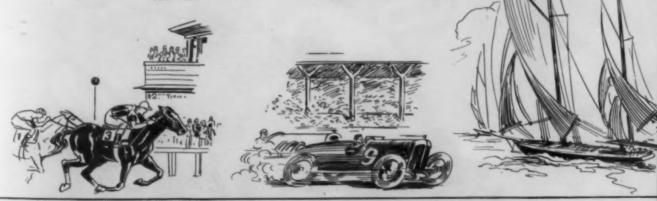
SPORT AND INDUSTRY

THERE is one distinct and definite similarity between Sport and Industry—the aims, ambitions and methods of those who aspire to leadership, are identical.

To excel in whatever form of sport calls for intensive and sustained effort to attain the coveted goal.

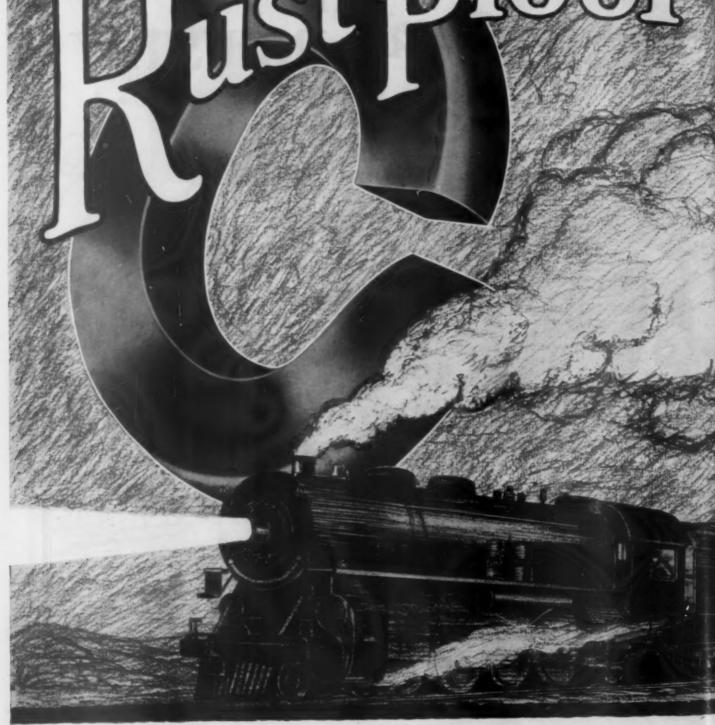
Similarly, in industry, there is demanded that patient, persistent and untiring will to win which does not halt or falter in the face of defeat; that dogged determination to use every failure as a stepping stone to success.

It is this perseverance of the Andrews Steel Co. in their development of Ra-loy Steel for vital parts in locomotive construction which lifts this product out of competition with ordinary Alloy Steel, for an operating standard is perfected in Ra-loy in which producer and user alike are rewarded by the character of the product and the quality of its service.



STEEL CO.

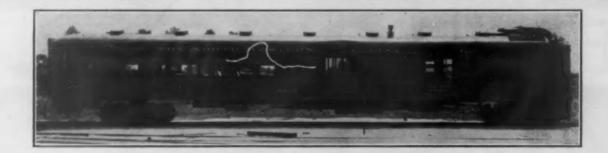
# IMPROVED



# HIPOWER

# IS Now Non-Corrosive as well as Non-Flattenable

The National Lock Washer Co.



### EQUIPMENT OFFERING

#### FOR LOCAL MAIN LINE PASSENGER

RESULTS of operation during past two years with Electro-Motive Gas-Electric Motive Power have proven to the satisfaction of many railroads that it is no longer necessary or profitable to continue steam train operation on many local main and branch line passenger trains.

This Equipment now in operation on twenty or more roads is proving its ability to operate in a thoroughly dependable manner. The average monthly mileage is in excess of that of steam power in comparable service.

Every Unit is showing an operating cost below that of previous steam service; in many cases operating costs are from one-third to one-half of steam costs. In some instances profits are being shown where deficits prevailed with steam train operation.

### THE ELECTRO CLEVELAND.



G

NE



#### ECONOMY AND EFFICIENCY

# AND BRANCH LINE SERVICE

If your problem is one involving single car operation or the handling of one, two or three trailing cars, we are prepared to offer equipment to meet such conditions with Power Plants of varying capacities, and can show economies over steam train operation.

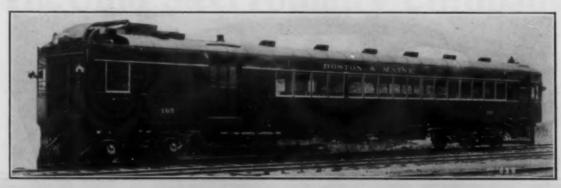
Cars are in service and under construction for following Roads:

	Cars		Cars
Baltimore and Ohio	5	Maryland & Pennsylvania	1
Boston and Maine	13	Mexican National	1
Canadian National	2	Soo Line	1
Chicago, Burlington & Quincy	5	Missouri-Kansas-Texas	1
Chicago Great Western	1	*Missouri Pacific	6
*Chicago & Alton	3	Mobile & Ohio	2
**Chicago & North Western	9	***Northern Pacific	10
***Chicago, Rock Island & Pacific	11	Seaboard Air Line	2
Cincinnati Northern	4	St. Louis-San Francisco	2
Grand Trunk Western	1	Union Pacific	11
****Great Northern	17	Victorian Railways	1
*Lehigh Valley	9	Wabash	2

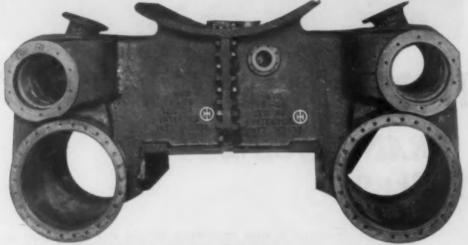
(\*) Indicates number of Repeat Order.

Let us show you where this Equipment can reduce your Operating Expenses

### MOTIVE COMPANY OHIO



# Cast Steel for



The Cast Steel Cylinder, an art pioneered in by The Ohio Steel Foundry Company, makes possible a reduction of from 2 to 5 tons in locomotive weight; provides stronger, more dependable cylinders that have three times the effective strength of cast iron; decreases cylinder maintenance costs, for the steel cylinder like the boiler, can be patched, caulked, or welded.



In the Channel-Oval section side frame, Ohio has secured a better metal distribution, supplying strength where the strain comes and making every pound of metal work.



locomo streng necess

OF '

Elastic Limit . . . .
Tensile Strength . .
Elongation . . . .
Reduction of Area .



# Railroad Work

Ohio High Test Vanadium Frames have in effective strength fully 50% greater han that of the ordinary carbon steel frame. This permits a lightening of the ocomotive weight without sacrifice of strength - important in view of the necessity of making each pound produce power.





Every Four-Wheel Articulated Trailing Truck now in service was cast by Ohio. The frame of this modern improvement in trailer trucks consists of an intricate steel casting. To produce it the builders naturally turned to The Ohio Steel Foundry Company, pioneers in cast steel cylinders and therefore experienced in such work.



#### OF THIRTY TESTS

TS

. . . . 52,583 lbs. per sq. in. . . 83,458 " " " "

. . 25.8% . . . 48.7%

Strength to resist the shocks encountered by heavily loaded equipment is worked into every bolster produced by The Ohio Steel Foundry Company.

Thousands of Ohio Bolsters are proving their dependability on American railroads.

#### The Ohio Steel Foundry Company Lima, Ohio

Plants at Lima and Springfield, Ohio

Pioneers in the Production of Cast Steel Cylinders

Locomotive Main Frames High Test Vanadium Vanadium and Carbon Steel

Bolsters and Truck SideFrames Locomotive Castings of all kinds

### One Hundred Years of American Railroading

A S the centenary of Steam Railroads in the United States approaches, the historical incidents of pioneering days grow in interest.

Below is shown some of the material worked into Bridgeport's Historical Railroad Series. Each of these roads now use Phono-Electric, Phono Hi-Con, or Phono Hi-Strength. With the trend of the steam road toward electrification in some, at least, of its activities, the economies of the Phono wire group is worthy of consideration.

#### The Phono Honor Roll



















THE above illustrations are selections from our historical railroad series, running currently in the trade press. The full set is available to railroad executives upon request.

Bridgeport Brass Company Bridgeport

Connecticut



Transportation Experience has Developed a More Attractive, Economical, Durable Motor Coach.



### Universal Transportation

#### Greatest Protection Ever

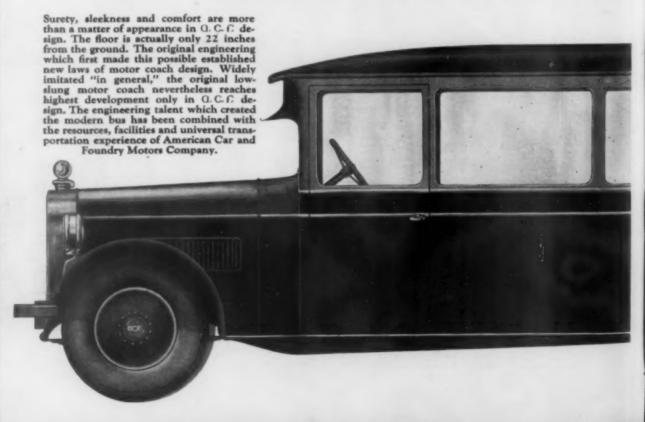
THE makers of Q.C.C motor coaches have a background of long experience in building street cars, gas-electric rail cars, passenger cars, freight cars and other types of transportation equipment—and motor coaches are transportation equipment. This broad, pioneer experience with every form of modern transportation underlies the success of Q.C.C. coaches and in large measure of the operators who use them. No finer engineering could enter into a motor coach. No higher responsibility could govern the sale of a single coach or of an entire fleet.

The mature judgment of American Car and Foundry Motors Company is based on universal transportation knowledge and experience. An Q. C. C survey of any local, inter-city or overland transportation project will be found helpful in revealing the true profit-securing possibilities. Sane, well-considered guidance, and sound, thoroughgoing recommendations from this organization will

help to assure the development of correct operating plans.

#### O. C. f. Coaches Are Always Modern

In other respects, also, the purchase of Q.C.f. motor coach equipment carries with it a degree of protection never before possible in this field. Firstevery Q. C. f. chassis is so designed that it can be kept in finest condition, and completely modernized, by means of the same methods which have long been standard with other types of transportation equipment. Q.C.C motors, for example, consist of a series of subassemblies-the head and valve unit, the cylinder block unit, the crankcase units, etc. If valve grinding is required on any Q. C. f. coach, the complete cylinder head assembly is easily removed and quickly replaced by a spare head, carried on hand. The coach goes out and earns while the valves are being ground! If cylinders should ever need



# Experience to Guide You Available in Coach Buying

regrinding, a new standard cylinder assembly can be installed—perhaps for less than repair operations would cost under other conditions.

The same plan is followed throughout the chassis. Maintenance is thus immensely simplified. And whenever scientific progress brings vital improvements they can often be economically applied to older Q.C.C. coaches by removing the original sub-assembly and installing a new one, made to fit.

#### Security for Your Investment

by American Car and Foundry Motors Company, the buyer has the advantage of dealing direct with the manufacturer, rather than with dealers or agents. And there is a fundamental business asset in the fact that the public always associates Q.C. Coaches with first-class travel. Every bus operator knows that Q.C. Coaches do bring this very definite added

asset of public appeal. In designing these Q. C. C. coaches, the experience of hundreds of millions of miles of service in practical city and interurban operations, with the product of companies whose control has been acquired, has been a safe guide in making the most durable and economical motor transportation vehicle yet produced.

Today O.C. C. coaches, developed from this basic experience, are ahead in safety, comfort, ruggedness, surety, power and economy. Whole fleets are being changed to an Q.C.C basis, once a single Q.C.C. coach is put into service. Q.C.f. coaches are also being specified on some of the biggest new equipment orders in bus history. Always, every operator benefits by the complete transportation knowledge which is available through American Car and Foundry Motors Company. Its resources, responsibility and practical knowledge are the soundest form of security for every investment in Q.C.C. equipment.



### Performance That Meets

#### These Coaches are developed from

TESTS by others are the proof of Q.C. C. value. Q.C. C. records and other data come not only from level city asphalt, but from cobbled hills and transcontinental highways as well. Both the multi-stop congestion of cities and the fastest overland tours are testing Q.C. C. coaches every day. Interurban lines, mountain stage routes, city schedules and all other forms of bus service have long been piling up the evidence on Q.C. C. coaches.

#### Proof Not Based on Favorable Conditions Only

Whatever the type of service expected, there are O.C.C coaches somewhere, already extensively making good, in comparable work. There are economy records obtained under the most severely competitive conditions. There are repeat orders based on nothing but direct profit to Q.C.C. operators. Complete adaptability to every requirement is assured, for Q.C.C. coaches have always returned extraordinary profits in all service, under the widest range of management policies.

### Public Confidence Gained and Retained

The very appearance of Q.C.C. coaches assures an instant impression of safety, comfort and smartness. Public confidence is captured and a receptive mood is created, which builds business. This

O. C. C body design provides the most inviting visibility and airiness. Attractively open or snugly enclosed, there is silence, comfort, luxury. Lighting and heating are adequate. Appointments inside and outside are complete. Extremely smooth driving and riding qualities banish fatigue and build business.





### Your Requirements First

#### Experience with ALL Transportation



Passenger comfort, and economical operation as well, depend very largely on driver efficiency. Perfected control and extreme visibility foster safe, interested, proper operation. One-man or two-man operation can be provided for. All legal regulations are met in every respect, without sacrificing operators' interests.

good will is retained by fast, frequent, smooth, silent service, made possible by the low, swayless suspension and agile, powerful motors.

Like the mechanical units of the chassis, Q. C. C bodies can be perfectly maintained with minimum expense and effort. Durable but attractive finishes and fittings are used throughout. Cleanliness, ventilation and lighting have all had the most thorough study. For it was Q. C. C principles which first banished truck-type bus service.

Today Q. C. C coaches are more than ever to be depended upon for the fea-

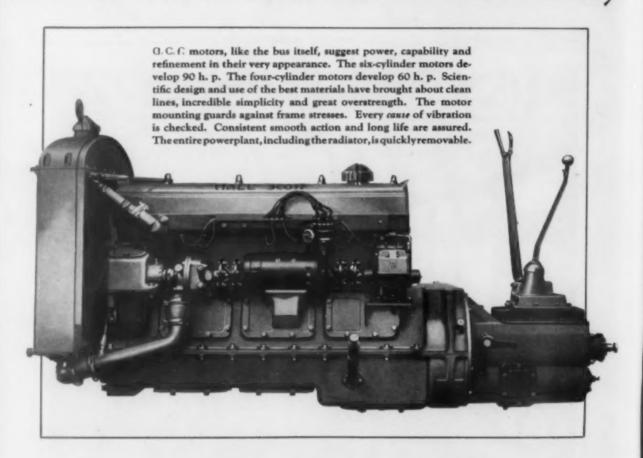
tures which win and hold business through sheer excellence, while returning the greatest possible margin of profit under all conditions.

### Years of Extra Mileage at No Extra Cost

As with all the transportation equipment built by Q.C.C., these coaches are made to meet exacting schedules fault-lessly—both in maintenance and in operation. Every unit and every detail of chassis and body are developed to return thousands of profitable passenger miles long after first cost is written off.

## Peak Torque at only 1000

#### Inherent Power makes these Coaches Lively



LIKE the entire coach chassis, the Q.C.f. Hall-Scott engine was designed specifically for motor coach work. Flexibility and acceleration compare with the best passenger car performance, without sacrificing durability or economy. The scientific achievements in this engine are revealed in the torque and output curves. Torque peaks at only 1000 R. P. M. in this 90 H. P. sixcylinder Hall-Scott engine. The load is easily handled at low engine speeds, preserving the motor.

Hall-Scott motors invariably pile up their 50,000 or 100,000 miles, before anything but simplest routine attention is required. This will be recognized as typical of Hall-Scott motors, long ranked among the finest in the world. Many of the most advanced principles of balance, carburetion, combustion economy, valve drive and lubrication originated in the Hall-Scott engine.

#### Maintenance on Scientific Basis

Development has been carried to the point where there is literally nothing "inside" of these engines but the crankshaft, rods and pistons! The entire valve mechanism, including the camshaft, is carried by the detachable head. The cylinder block is a single smooth unit, so simple that, despite costly material, it can be replaced entirely when it reaches the regrinding stage. The crankshaft is the hardest alloy steel shaft used commercially—regrinding is virtually never required. The Q.C.C radiator mounts on the motor base, eliminating all trouble from frame-mounting.

A whole array of such exclusive engineering principles and details assures more mileage from every gallon of gasoline and oil; from every hour of labor. With all its technical refinement the Q.C.C. Hall-Scott motor remains simple

### R. P. M.-Sure Economy

#### and Fast while the Engine "Takes It Easy"

and rugged. Not a single part or function requires specialized care such as is needed for many other types of motors which are often less accessible, difficult to lubricate, and subject to higher friction and combustion losses.

#### Chassis Also Highly Advanced

Unit-mounted with the Q.C. C. Hall-Scott engine are the multiple-disc clutch and the four-speed transmission. The arrangement of engine accessories is clean, compact and accessible.

The whole Q. C. C chassis is on a par

with this highly refined power plant. O.C. C. design reflects the experience gained from millions of miles of successful passenger transportation by O.C. C. coaches. The assurance of smooth, quiet, comfortable, safe travel which sells O.C. C. coaches to the greatest operators also sells the motor coach *idea* to the public.

In addition to their engineering excellence and established low-cost operating records, O.C.C. coaches always bring this one undeniable advantage—PEOPLE LIKE TO RIDE IN THEM.

#### Gas and Gas-Electric

Body and Chassis Types for All Service

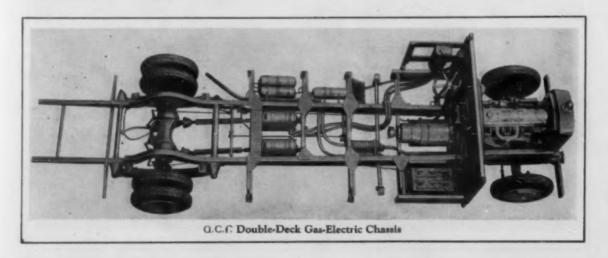
NOTED particularly for development of the motor coach parlor car, Q.C.C also builds buses of the street car type, both gas and gas-electric.

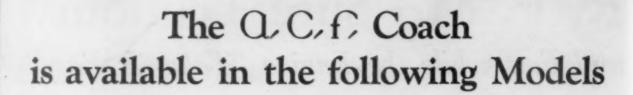
The decided advantages of electric final drive, in multi-stop operation especially, are already largely accepted. O.C.C gas-electrics occupy a peculiarly favorable position, because O.C.C practice so largely offsets any tendency toward weight and complication in gas-electric layouts. The combined engineering effort of General Electric and American Car and Foundry could hardly

have produced anything but a highly advanced type of vehicle.

The suitability of gas-electric or gasoline chassis with any body styles will be analyzed in detail upon request. The O.C.C. Transportation Staff will gladly serve any bus operator, regardless of the size of operations, or the type of equipment now in use.

Benefit by this broad constructive policy. Draw upon the universal transportation experience of American Car and Foundry Motors Company.





#### MECHANICAL DRIVE

29 Passenger Street Car 31 Passenger Street Car 26 Passenger Parlor Car 60 Passenger Fully Enclosed Double-Deck

#### GAS-ELECTRIC DRIVE

29 Passenger Street Car 31 Passenger Street Car 60 Passenger Fully Enclosed Double-Deck

#### SMALLER MODEL COMING

Watch for the announcement of the smaller O.C.C. Six-Cylinder Coach, to be made in two models—21 Passenger Street Car and 16-20 Passenger Parlor Car. These models will be powered with a new Hall-Scott Engine identical in type with the present 4½" x 5½" Hall-Scott Six, but smaller in size.

We will be glad to send you full information concerning any of these models in which you may be interested, and also to outline for you the benefits that you can derive from the service of our Transportation Staff.

#### AMERICAN CAR AND FOUNDRY MOTORS COMPANY 30 CHURCH STREET, NEW YORK

FACTORIES: DETROIT, MICHIGAN and BERKELEY, CALIFORNIA



The 31 Passenger Street Car Type



#### The New All-Weather Road to Yosemite



One of the Goodyear-equipped fleet of buses operated by the Yesemite Park and Curry Co

That queen of the national parks—Yosemite—no longer is hidden away a part of the year, but in all seasons now stands forth in the full glory of mountain crown and Bridal Veil falls, giant sequoias, jeweled lakes and bright shawls of wildflowers.

The completion of the all-weather route makes this superb public playground accessible the year around. And the official public motor travel over this all-weather route — the swift, luxurious touring buses of the Yosemite Park and Curry Co.—is insured dependable, secure and economical tire service at all times by Goodyear Pneumatic Bus Tires.

During summer months these buses equipped with Goodyear All-Weather Treads penetrate daily the high Sierras beyond Yosemite Valley. Grades reach as high a pitch as 24%, and the cars top an elevation of 10,000 feet.

Dirt road, and some of it hard to negotiate, this is a route that calls for real tires—tires with tractive power, hold-fast and hang-on grip, stout carcasses. It's the kind of duty that best is served by the Goodyear All-Weather Tread Tire.

President D. B. Tresidder, of the Yosemite Park

and Curry Co., reports that already their Goodyear Tires have established their mastery of the Yosemite roads. With all of them delivering a high average mileage much in excess of any previous tire performance, some of them have run as much as 24,000 miles in this exacting duty.

"Our Goodyear Tires," says Mr. Tresidder, "are delivering us the kind of tire service that fits in with our every equipment provision for making this park a genuine all-year public playground. Come out this Winter, and see how easily, safely and pleasantly you can go in a few hours from California's main traveled highways into the heart of the greatest winter-sports land and scenery in all the world."

Goodyear Pneumatic Bus Tires are made with Supertwist, the extra-elastic, extra-enduring fabric developed by Goodyear for Goodyear Tires. They are made with the famous All-Weather Tread, famous for traction, for skidless travel, and for wear. They are durable. They cushion. And they cost less per tire-mile.

Only Goodyear Tires are made with Supertwist —yet they cost you no more.

More people ride on Goodyear Tires than on any other kind

GOOD YEAR
Copyright 1937, by The Goodyear Tire & Rubber Co., Tax.



#### FURTHER EVIDENCE

Mack products have consistently held a position of leadership in the various branches of highway transport work during the past twenty-six years and will continue to do so, upon the basic realization of the builders that profits can only parallel performance and that outstanding performance is only possible where outstanding quality exists in every part of the vehicle carrying the load.

Eight months ago we published in this magazine 52 names of Railway Companies using Mack Equipment. Today we present a list of 232 representative users in the field of Public Utilities as further evidence of the strong position that Mack holds.

PERFORMAN



#### Partial List of Public **Utility Companies Owning** MACK TRUCKS, BUSES, RAIL CARS

\*Indicates the names on the list published eight months ago.

erdeen & Rockfish R.R.
irondack Power & Light Co.
toona & Logan Valley Elec. Co,
toona & Logan Valley Elec. Co,
toona & Logan Valley Elec. Co,
tansas Central Power Co.
tansas Central Ry. Co.
tansas Central Ry. Co.
tansas Central Ry. & Lt. Co.
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\*Illinois Power Co.
Iowa Ry. & Light Co.
Iowa Southern Utilities Co.
Jersey Central Light & Power Co.
Kansas City, Leavenworth & West. Ry.
Kansas City, Leavenworth & West.
Key West Elec. Co.
Kings County Light & Power Co.
Leakigh Traction Co.
Lehigh Traction Co.
Lehigh Traction & Watsontown Ry. Co.
Logis and R. R.
Lordship Ry.
Co.
Los Angeles Gas & Elec. Co.
Manitoba Power Co.
Manitoba Power Co.
Memphis St. Ry.
Miamit Elec. Light & Power Co.
Middleser & Boston St. Ry.
Minneota Western R.R.
Missouri Power Co.
Mississippi Valley Elec. Co.
Mississippi Valley Elec. Co.
Mississippi Ry.
New Orleans Pub. Service Co.
New Haven Gas Light Co.
N. Y. & Queens Elec. Lt. & Power Co.
N. Y. & Queens Elec. Lt. & Power Co.
N. Y. & Queens Elec. Lt. & Power Co.
N. Y. & Queens Elec. Lt. & Power Co.
Northern Ohio Traction & Light Co.
N. Y. & Gueens Elec. Lt. & Power Co.
Northern States Power Co.
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#### USING MACK TRUCKS THROUGH CONTRACTORS

USING MACK IRUCKS I HROUGH
CONTRACTORS
lew York Central Railroad
olumbla Terminal Co., of St. Louis, who own? I
Macks and serve the following Railroads;
hicago & Aiton R.R.
hicago & Aiton R.R.
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licago & Louis, Columbia & Waterloo Ry,
risco Lines
linois Traction System (Elec.)
ouisville & Nashville R.R.
linois Traction System (Elec.)
ouisville & Nashville R.R.
lissouri-Kanasa-Texas Lines
lissouri-Kanasa-Texas Lines
lissouri-Kolicago & St. Louis R.R.
lobile & Ohio R.R.
ew York, Chicago & St. Louis R.R. Co.
t. Louis Southwestern Ry. Lines
outhern Ry. System
'abash Ry. Co.
hicago, Feoris & St. Louis R.R.
ltchfield & Madison Ry.
t. Louis, Troy & Eastern R.R.
attimore & Ohio R.R. Co.

MACK TRUCKS, Inc. INTERNATIONAL MOTOR COMPANY

25 Broadway New York City

One hundred and four direct MACK factory branches operate under the titles of : "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION", "MACK MOTOR TRUCK COMPANY", or "MACK TRUCKS OF CANADA, LTD.".

# G BODIES

create new passengers



It is the more intimate details of interior furnishing that, by their thoughtfulness, add a finishing touch of friendliness to essentially attractive Lang Body Designs.

In the sightseeing type of body, for instance, full range vision becomes a reality. Side-posts, sash and roof frames are of minimum size commensurate with strength. Window and top openings are so arranged that every passenger has a clear view.

While in the event of sudden storm the sightseeing coach quickly becomes a cosy parlor car.

Every ride in a Lang Body is a welcome invitation to "call again." And every Lang Body is built to keep its smart new appearance through a long hard life of service.

Prominent Bus Chassis Manufac-turers for Whom We Build Bodies

International Harvester Company Yellow Coach & Truck Mfg. Company

THE LANG BODY COMPANY Cleveland, Ohio



## 700,000 miles prove Studebaker dependability



Because of 700,000 miles of satisfactory experience with Studebakers since 1923, J. L. Kiser, owner of the White Star Line, Knoxville, has just put in service eight new Studebaker 20-passenger Parlor Car De Luxe busses on the run between Knoxville and Maryville, Tennessee. It was the continued profitable operation of Studebaker equipment that caused Mr. Kiser to standardize on Studebakers.

In this territory roads, in many instances are rough and winding—even the best highways reaching into the rugged mountains of eastern Kentucky and Tennessee test the stamina bus equipment. Studebaker's outstanding success on these mountain roads over a period of years has caused other operators to standardize on Studebaker units.

Today more than 60 per cent of all bus equipment leaving the Knoxville bus terminal is Studebaker. Lines running to points within a radius of 125 miles, served by Studebaker equipment, average 3,000 miles daily giving prompt and dependable transportation.

For inter-city and suburban service the

#### Six Body Designs, 12 to 21 Passengers \$3935 to \$6150

Prices f. o. b. factory, covering body and chassis, complete. Purchase can be orranged on a liberal Budget Payment Plan— Small down bearmest and balance in convenient monthly installments.

"Timents or	new bedamens	0.00 0000				
12-Pass.	(including	driver)	cross-seat	Sedan	Type	.\$393
15-Pass.	(including	driver)	cross-seat	Sedan	Type	.\$429
18-Pass.	(including	driver)	side-entrar	ice Par	rlor Car.	.\$530
	(including					
20-Pass.	(including	driver)	Parlor-Car	r De 1	Luxe*	.\$6150
21-Pass.	Pay-as-Yo	u-Enter	Street-Car	r Type		.\$512

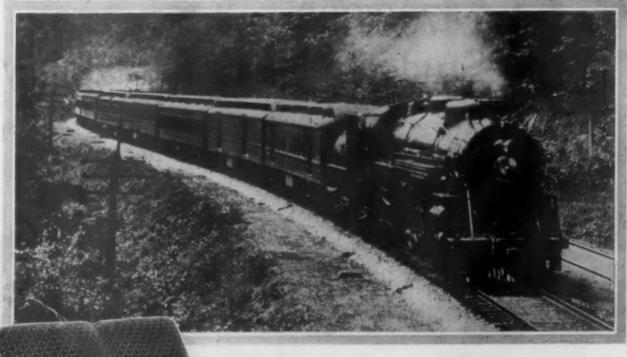
Studebaker Parlor Car De Luxe Bus is an ideal unit. Mounted on the Studebaker bus chassis of 184-inch wheelbase, the body offers a degree of luxury and comfort comparable only to busses selling for \$10,000 and up. Deep leather seats, ample leg room, broad aisle, wide windows, six dome lights, excellent ventilating and heating system provide the comfort and luxury that riders demand.

There is ample power in the Big Six engine to carry this bus, fully loaded, over any road in any weather. According to the S.A.E. rating it is the most powerful bus chassis of its size and weight in the world.

An investigation in a number of cities revealed the fact that it cost 7 to 9 cents less per mile to operate a Studebaker bus. This saving means big black figures on the profit side of the operator's ledger.

Lower first cost, plus its longer life, guarantees the lower depreciation cost of the Studebaker chassis. This saving with lower operating cost assures the Studebaker operator more profit per passenger mile.

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No. 397-A With Open Steel End

## Comfortable Cars

### Insure Bigger Revenues

YOU can't stop passengers from talking—they're bound to comment upon the appearance, design and comforts of your coaches.

The satisfied passenger tells his friends—those friends have their friends—the road makes a reputation and revenues begin to swell.

Passengers riding on Hale & Kilburn Car Seats instinctively know and appreciate that there has been an effort made to make their journey as comfortable as possible—and they don't forget to tell their friends.

Hale & Kilburn Car Seats have been standard for years upon most of the principal railroads throughout the country.

Hale and SEATS





Type 900-D
Double Chair
(Single End Car or Bus Type)

## A Vital Factor In Your Bus Operation

R AILROADS using or considering using motor transportation will find that the traveling public of today demands above all good comfortable riding buses. No other factor plays a more important part than the seats.

The 900-D double chair, illustrated, is the newest of the long line of H-K seats for modern transportation. It represents the very height of luxury. For steam passenger service this chair has another arm and a rotating base. Upholstered in leather or fabric, the 900-D has deep hourglass spring cushions with air spring cushion pads made so they cannot be promiscuously removed.

And that is not all—the same long wearing qualities which have made Hale & Kilburn car seats famous for over a half a century will be found in Hale & Kilburn Bus Seats.

#### HALE-KILBURN COMPANY

General Offices and Works: 1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

Hale-Kilburn Co., 30 Church St., New York
Hale-Kilburn Co., McCormick Bidg., Chicago
E. A. Thornwell, Candler Bidg., Atlanta
Frank F. Bodler, 908 Monadnock Bidg., San Francisco
Chris Beeles, \$20 S. San Pedro St., Los Angeles

T. C. Colen an & Son, Starks Bidg., Louisville W. L. Jefferies, Jr., Mutual Bidg., Richmond W. D. Jenkins, Practorian Bidg., Dallas, Texas W. D. Jenkins, Carter Bidg., Houston, Texas H. M. Buler, 46 Front St., Portland, Oregon

Hale and SEATS Kilburn SEATS



#### THE RIGHT HAND OF INDUSTRY

The teeming activities of the great industrial plant and the steady progress of the small, but successful business, call for power throughout the day.

Continental Motors are the right hand of industry. Designed and built for particular needs, they function with a dependability which insures economical gasoline power for countless thousands of daily users.

And a performance record, based upon 26 years of motor building, is a definite assurance of user satisfaction wherever gasoline power is employed.

Put Your Power Problems Up To "Power Headquarters"

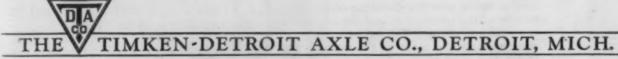
CONTINENTAL MOTORS CORPORATION

Offices: Detroit, Mich., U. S. A. Factories: Detroit and Muskegon The Largest Exclusive Motor Manufacturer in the World

Continental Motors



its users look upon it as the ideal final drive; for its rugged simplicity, longlived economy, and noiseless efficiency.



## TIMKEN AXLES

## INVESTIGATE |







## The New OHMER Ticket Printing Register for

Electric Railways, Steam Railways, Motor Coaches, Ferries, Excursion Boats, Steamships, Toll Bridges, Ticket Offices.

Wherever Fare Protection
 Is Needed.

# Ticket-Printing Fare-Protecting Register!

It is the most revolutionary development in the history of passenger transportation for eliminating losses in ticket selling and fare collecting. It stops the hidden leaks, detects inefficiency and carelessness, removes temptation. It positively enforces an accurate accounting of every penny received for every passenger carried.

#### Printed, Unchangeable Records

It provides a locked-in, secret, untamperable record of every detail of every fare transaction—a record that shows the amount of fare paid, the station or zone from and to which the passenger is carried, the direction traveled, the class of ticket sold, the date, the consecutive number of the transaction, and the conductor or operator in charge. This record is instantly and automatically made at the moment the transaction takes place and corresponds to the

**Recording Devices** 

information appearing on the ticket which the register prints and issues.

With such a record both on the ticket and also locked up inside the register, you have unsurpassed protection against losses of all kinds in ticket selling and fare collecting.

#### 27 Years' Experience Behind It

This new Ohmer Ticket-Printing Register is the development of 27 years of experience in making nothing but precision recording and printing devices for transportation companies. It is light and compact, exceedingly simple and easy to operate, will give years of trouble-free service, and pays for itself over and over again by the money it saves.

Let us tell you more about it. A full description will be send you on request. Or, if you prefer, we will have one of our representatives call and explain it to you personally. This will not obligate you in any way. Write or wire today.

OHMER FARE REGISTER COMPANY Dept. Z, DAYTON, OHIO, U. S. A.

HAMER PLATE OFF.

Transportation

## GURNEY

BALL BEARINGS

25% increased ball capacity with Molybdenum Steel Balls. Tested! Proved!

Molybdenum Steel Balls are now standard in all Gurney bearings, giving considerably greater capacity and longer bearing life.

Send for new data sheets just issued

8369

MARLIN-ROCKWELL CORPORATION, JAMESTOWN, N. Y.



New!

This 24-inch diameter Golden-Glow Floodlight

Type FLA-2430

A new, powerful Golden Glow unit, using a 24-inch diameter mirrored glass reflector, for long range floodlighting. It projects a beam of high intensity and reduces to a minimum the number of towers required in lighting railway yards.

The case is of cast aluminum alloy with a hinged rear door in which the reflector is mounted. This construction provides easy access to the interior without disturbing the focusing or training of the unit. The case is absolutely weather-proof.

The many unique features built into this new unit will be of interest and of value to those contemplating the purchase of new equipment. Complete data on request.



Type 832-Keystone Turbo-Generator, 800 watts, 32 volt. For use in Automatic Train Control Service.

Write for bulletins covering Golden Glow Locomotive Headlights, Keystone Turbo Generators, Keystone Headlight Switches and other headlight accessories. Also Keystone Motor Bus Equipment.



Type FF-1412—Golden Glow Locomotive Headlight.

#### ELECTRIC SERVICE SUPPLIES Co.

PHILADELPHIA 17th and Cambria Sts.

PITTSBURGH

MANUFACTURERS NEW YORK 50 Church St.

BOSTON 88 Bread St. St.

SCRANTON 316 N. Washington Ave.

CHICAGO Illinois Merchants' Bank Bldg.

DETROIT General Motors Building



Is one of your problems here illustrated? If not, tell us something of your process, as there is a Yale Electric Industrial Truck for every type of service. May we send you the latest Yale Truck Bulletins?

## Yale Trucks Prove Indispensable!

The Yale K Series Electric Industrial Trucks, with or without special attachments, prove indispensable from the moment they are put in service. Many unusual handling jobs readily lend themselves to a specially devised Yale trucking system—and at lower costs than possible by any other method. Write our engineers. Their experience is at your service.

- Yale Model K24B Tractor-Trailer Train handling miscellaneous cargo in stevedoring service.
- (2) The Yale K22 Elevating Platform Truck being used in California as a shooting platform for the director and photographer.
- (3) Yale Model K24A Tractor in express service.
- (4) Coils or reels of wire are easily handled by a Yale Model K22 Elevating Platform

Truck with Boom attachment.

No.5

- (5) Stacking 8,000-pound rolls of paper with Yale K22 Elevating Platform Trucks having an overall height of 146 inches.
- (6) Yale Model K22 handling bulk clay in the terra-cotta industry.
- (7) Yale K22 Elevating Platform Truck used for spotting freight cars in and out of machine shop.

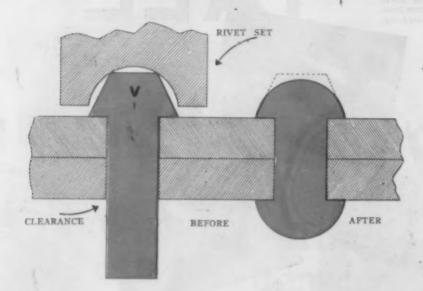
The Yale & Towne Mfg. Co., Stamford, Conn., U. S. A.

YALE MARKED IS YALE MADE



Hoisting Conveying Systems

#### Standardize and Unify Your Rivet Stock





### On the Strength of Riveted Joints

STOCK ONE GRADE OF GOOD RIVETS ALL CONE HEADS

Use them for all purposes where Cone Head and Button Head Rivets are ordinarily required. One stock will serve Boiler Shop and Car Shop and do better work as the holes will be more completely filled when the rivets are properly heated and driven.



ARE you getting full strength from your riveted joints? You will be surprised if you cross-section one of them.

The average rivet hole thus examined is seldom filled.

Rivet holes that are not filled are not giving you 100% for your work.

A Cone Head rivet driven with a button rivet set is the answer.

The surplus metal found in a Cone Head rivet will be driven into the hole.

There will be no excess of metal above the plate because—the button rivet set prevents it and forces it into the hole.

In structural work this idea will result in greatly increased strength.

In Boiler and Tank work less caulking will be necessary besides.

In general a 10% to 20% benefit will be derived at an insignificant cost.

Think it over carefully

#### The CHAMPION RIVET Company

CLEVELAND, OHIO

LARGEST MANUFACTURER OF HIGH GRADE RIVETS IN THE WORLD

Western Plant

East Chicago, Ind.

## CHAMPION VICTOR RIVETS



## A Real Service Test

IN a service test of two and a half years' duration made by a large Trunk Railway, in locomotive with full installation of Falls Hollow Staybolts, only four bolts were broken. Does not this test show real efficiency and economy?

The use of Falls Hollow Bars in ten to fifteen feet lengths reduces your stock balance to a minimum.

Many of the large Railway Companies are now enjoying perfect satisfaction through the use of our Staybolt Iron.

YOU TAKE NO CHANCES! Our guarantee protects you. If we did not have unlimited faith in the high quality of our Staybolt Iron, under such a sweeping guarantee as we give you, we could not remain in business long.

Our prices are as low as is consistent with high quality. We use ony the highest grade puddled pig iron muck bar, guaranteed to meet A. S. T. M. specification for Grade A Staybolt Iron, physically as well as chemically.

SEND IN A TRIAL ORDER NOW! BE CONVINCED OF FALLS HOLLOW SUPERIORITY! Ask for a copy of our Guarantee!

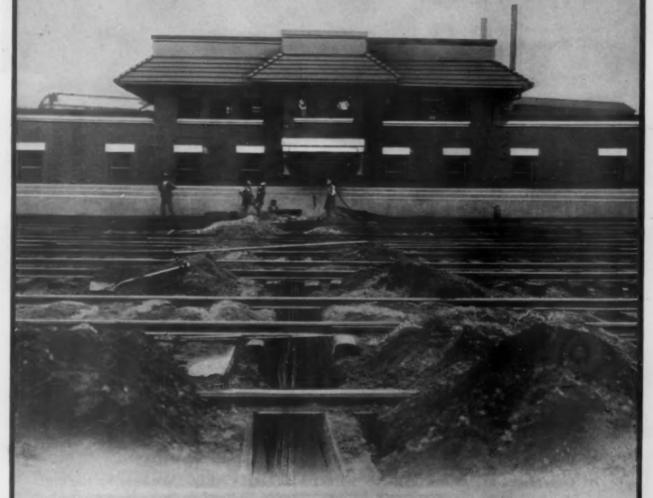
#### FALLS HOLLOW STAYBOLT CO.

CUYAHOGA FALLS, OHIO

#### JACKSONVILLE TERMINAL

JACKSONVILLE, FLA.

Installing OKONITE Multiple Conductor Lead, Steel-Taped Cables



#### THE OKONITE COMPANY THE OKONITE-CALLENDER CABLE COMPANY, INC.

FACTORIES: PASSAIC, N. J. PATERSON, N. J.

SALES OFFICES: NEW YORK . CHICAGO . PITTSBURGH . ST. LOUIS . ATLANTA
BIRMINGHAM . SAN FRANCISCO . LOS ANGELES . SEATTLE

Pettingell-Andrews Co., Boston, Mass.

Novelty Electric Co., Philadelphia, Ps. F. D. Lawrence Electric Co., Cincinnati, O.

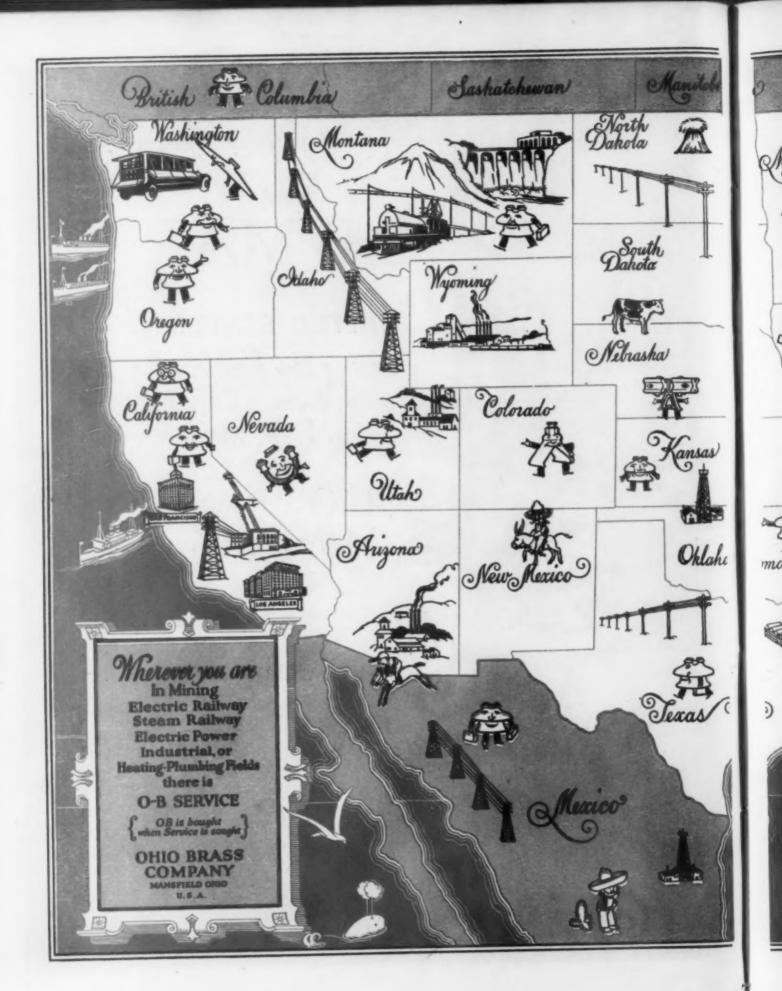
Canadian Representatives: Engineering Materials Limited, Montreal

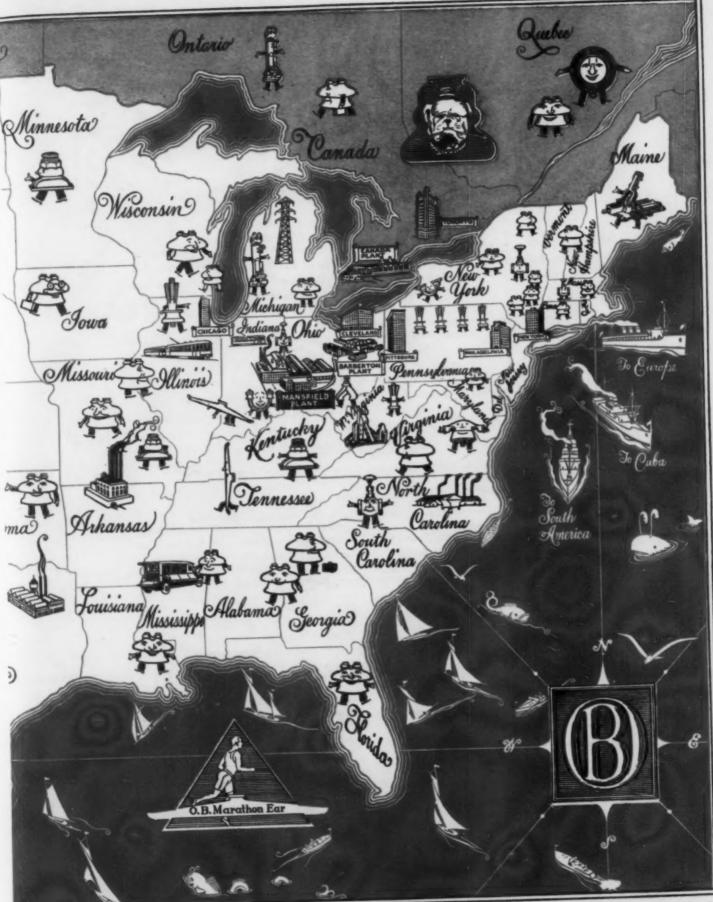
Cuban Representatives: Victor G. Mendosa Co., Havana











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Copyright 1927 Ohio Brass Co.



Main Office and Plant: Mansfield, Ohio, U.S.A.

Porcelain Insulator Plant Barberton, Ohio, U.S.A.

#### Branch Offices

50 Church Street - - - New York, N. Y.

1404 Packard Building - Philadelphia, Pa.

2044 Oliver Building - - Pittsburgh, Pa.

343 S. Dearborn Street - - Chicago, Ill.

215 Market Street - - San Francisco, Cal.

417 S. Hill Street - - Los Angeles, Cal.

1300 Union Trust Building - CLEVELAND, ORIO

#### Dominion Insulator & Manufacturing Company, Limited

(Manufacturing Ohio Brass Co. Products in Canada)

NIAGARA FALLS, CANADA

#### Branch Offices

801 CPR Building - TORONTO

416 Phillips Place - MONTREAL

#### Foreign Sales Agents

Frederic Attwood, General European Agent, 18 rue de Tilsitt - Paris, France

#### Foreign Agents

Messrs. Frowijn & Co. - Apeldoorn, Holland Ingenior Gabriel Greiff, Amerikalinjens Gaard - Oslo, Norway Oscar Dieden - - - Stockbolm, Sweden Ateliers de Constructions Electriques de Charleroi - - - Charleroi, Belgium Omnium Iberico Industrial - Madrid, Spain Kendall Knight & Co. Melbourne and Sydney, Australia

Carrick Wedderspoon, Limited - Christchurch and Palmerston North, New Zealand

#### **PRODUCTS**

#### Porcelain Insulators

For all voltages and applications. Fin types; suspension; wall, roof, transformer and oil switch bushings; pillar; switch and special forms; strain insulators and fittings; third rail insulators.

High Tension Line Hardware.

#### **Trolley and Line Materials**

Trolley hangers; care; clamps; frogs; splicers; crossovers; section insulators; pole brackets; guy wire fittings; catenary hangers and clips; trolley guard.

#### Rail Bonds

For head, web and base of rail, also for third rail; electric are-weld, gas wold and mechanically applied.

#### Electric Railway Car Equipment

Toulinson automatic ear, air and electric couplers for light and heavy traction; trolley catchers and retrievers; air sander equipment; city, suburban and interurban ear headlights; trolley wheels and harps; trolley bases.

#### Valves (Brass)

Globe-gate-angle-check for steam, hot or cold water, gas, air and special service.

#### Mining Materials

Trolley hangers; clamps; frogs; splicers; cross-overs; section insulators; pole brackets; guy wire fittings; trolley whoels and harps; trolley shoes; locomotive headlights and other miscellaneous electric haulage and power feeder line materials.



#### IDECO STEEL BUILDINGS

#### Cut Maintenance Costs

BACK of the surprising simplicity of IDECO Standardized Steel Buildings are fundamental factors of design which have a direct bearing upon durability, ease of erection and low maintenance costs.

Simplicity of design makes possible ease in erection. Every piece and part go together smoothly and easily.

IDECO Standardized Steel Buildings are the only steel buildings on the market regularly furnished with a galvanized steel frame. The strength of a building is in its frame. Unless adequately protected against rust, rot and corrosion its life is short. Examine the frame of the next steel building you see. You'll appreciate the value of galvanizing.

Write our Railroad Department for further information

THE INTERNATIONAL DERRICK AND EQUIPMENT COMPANY

Columbus, Ohio

Torrance, Calif.

Houston, Texas

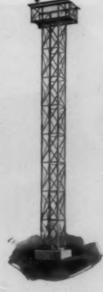
Branches Tulsa, Okla.

New York City

Export Offices

30 Church St., New York

Houston, Texas



IDECO Galvanized Flood Light Towers

When the proposition of lighting your yards, terminals and buildings arises use IDECO equipment.

Heavily galvanized, these towers will resist rust, rot and the corrosive acids and sulphur in the smoke. They are built of the highest quality structural steel in a variety of designs to meet any specific requirement.

IDECO also builds switch towers, signal bridges, steel poles, transmission towers and sub-stations.



Columbus, Ohio

Los Angeles, Calif.

### The No. 2 Bobtail





Locomotive Cranes-Crawler Cranes-Gas Cranes

## Does Not Tie Up Traffic

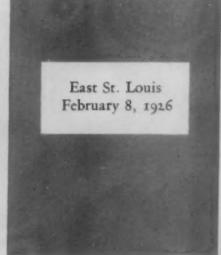
The No. 2 Bobtail does not tie up traffic on adjacent tracks. The amount of swing is controlled by adjustable stops which allow the operator to work with speed and safety. He knows that through traffic will clear. That's why each one of both Bobtails on this job was able to clear ballast on 1000 feet of track in one day. The illustration below shows how far the No. 2 can be swung before the cab overhangs the trucks. The mechanism is so arranged that there is a surprisingly large amount of room for the operator and fireman. MCMYLER Send for a floor plan. The McMyler-Interstate Co. Cleveland, Ohio New York Philadelphia Buffalo Pittsburgh Chicago Detroit San Francisco Los Angeles C-2-113

# - Interstate

Power Shovely- Clam Shell Buckets

## An Outstanding





Markham (South Bound) March 22, 1926







## Achievement in 1926

East St. Louis, Markham Southbound, Blue Island, and Hartford -- four important hump yards which were equipped during 1926 with the

#### G-R-S All Electric Car Retarder System.

Lower operating costs and faster classification of cars were two outstanding benefits derived.

#### Other benefits were:-

increased yard capacity, reduced damage claims, increased efficiency of employees, reduced car equipment damage, increased use of all cars, reduction in personal injuries, elimination of delay in securing additional car riders to meet the peak volume of reduction in motive power for yard

operation, reduction in delay due to bad weather. A Few Features of the Retarder

Movement of retarder either forward or reverse can be secured without any unnecessary loss of retardation. Articulated construction of retarder members increases efficiency, reduces power consumption, allows installa-tions on curve track and reduces binding effect when track settlement occurs

Individual adjustment provides for the position of each retarder shoe and the tension of each retarder spring. An overall adjustment is provided to take up shoe wear.

Springs can be easily removed and replaced.
All spring pressure is approximately on horizontal center of area where retarder shoes engage wheels, thus minimizing any cramping or binding effect in the moving members.
All forces self contained and not transmitted to mech-

No rivets used in retarder assembly. No concrete foundation required for retarder mech-

Failure of power leaves available any retardation which was set up at the time of power failure.

Only one kind of power required and that electrical, which is not affected by low or changing temperatures.



## GENERAL RAILWAY SIGNAL COMPANY

New York Chicago

St. Louis

Montreal

Melbourne

## Have YOU provided for these ed



#### **Automatic Signals**

VER \$5,000 annual payroll savings, not including savings from greatly facilitated train movements, resulted from equipping about six miles of single track with automatic signals and operating trains by signal indication, eliminating all written train orders.

From 30 minutes to 3 or more hours shorter running time for freights has resulted from an installation of automatic signals on a single track division of about 100 miles. Shippers' demands for faster freight delivery are thus met.

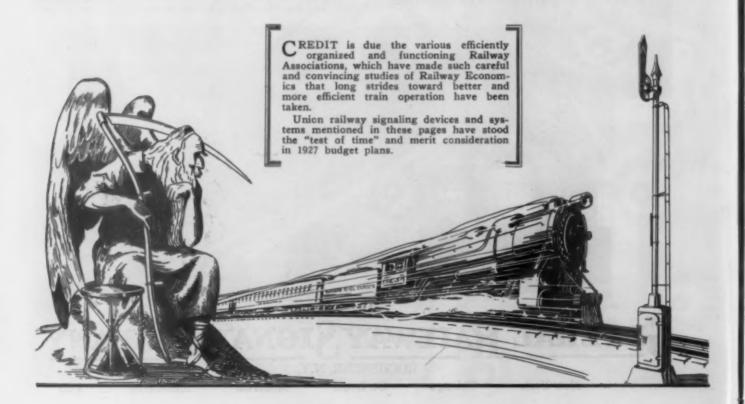
Union engineers are available for making traffic studies upon request—and without obligation.

#### **Interlockings**

AVINGS effected by interlockings are conceded. Additional savings result if two or more plants can be consolidated. Over \$24,000 annual saving in operation and maintenance has resulted through the consolidation of interlockings at 5 different locations.

Union Electro-mechanical machines are particularly suited for consolidation of two or more existing mechanical interlockings.

From 200 to 600 more tons per train are being handled on two districts after the installation of Automatic Crossing Protection where traffic density does not justify interlockings. Stops are eliminated and running time between terminals reduced. Installations may pay for themselves in less than a year.



### economies in this year's budget?



#### **Outlying Switches**

VER \$7,500 per year is the estimated saving one superintendent placed upon the use of a remotely controlled switch machine at a junction point. This saving is not unusual. The average saving reported from many outlying switch installations indicate that all charges involved are written off in a year's time.

Operating men need only take a moment to recall an incident or conditions pertaining to at least one delay at some particular hand-thrown switch on their road to realize the fact that such delays are occurring every day. Remotely controlled power operated switches are as reliable as the signal systems-and no comment is needed as to this reliability.

The control of switches and signals from a remote location has now become so common that such installations show the claims of guaranteed performance have been more than justified.



#### Highway Crossings

EPLACEMENT of flagmen and crossing gates with highway crossing protection signals at 96 crossings has resulted in an estimated saving of \$172,685, or an average saving for each crossing so protected, of \$1,800. The average complete cost per crossing of such installations, as reported by the A.R.A. Committee on Economics of Railway Signaling, is \$1,694.53. Here, again, we find that material and installation charges are wiped out in less than a year.

Recent development made by this Company of new equipment related to highway crossing protection encourages the belief that still greater economies will result through the use of Union material.

Style DW Automatic Flagmen or Union Color Flashing Light Signals will provide adequate crossing protection 24 hours each day.

#### Car Retarders

HERE are tangible economies reflected in train operation where Car Retarders are used instead of car riders at hump classification yards. At one location where operating cost statistics were available before and after installation of car retarders, power operated switches and skate machines, it was determined that the improvement saved the railroad 32.8 cents on every car humped.

The Electro-Pneumatic Car Retarder System has a latent capacity to handle peak business without additional cost. Complete information covering this flexible and powerful system, and its application to one of the largest hump yards in this country, is given in our Bulletin 108-"Modern Yard Operation", copy of which will be sent on request.



Union Switch & Signal Co.

SWISSVALE, PA.

## LEST WE FORGET

ONE MAN'S FOOD
IS
ANOTHER MAN'S POISON

## OUR PRODUCTS ARE RAILROAD STANDARDS

FOR EVERYBODY
BUT WITH SOMETHING WORTH WHILE
FOR ANYBODY

The Rail Joint Company

165 Broadway

New York City

#### Oxweld Railroad Service

An individual service for each individual road

Oxweld Railroad Service is not an inflexible or standard service. It is adapted and modified to meet the needs of each individual road that employs it.

It is equipped to render such service because, during its 14 years of life, it has built up an organization of more than 200 men—engineers, welding experts, mechanics and other specialists. This staff has vitalized the resources and experience of the organization into a real force for railroad progress.

That is why a majority of the locomotives, cars and tracks in the country are served by Oxweld Railroad Service.

THE OXWELD RAILROAD SERVICE COMPANY

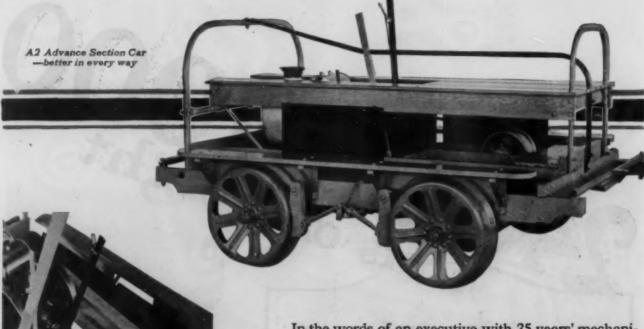
Unit of Union Carbide and Carbon Corporation

New York City: Carbide and Carbon Building



Oxweld Railroad Service

Performance on the Job Counts



FAIRMONT Advance
Drive-Endless Cord Belt
-light tension-reduction
by ball and roller bearing
hardened steel gears in
oil-tight dirt-proof case
-change oil once a year

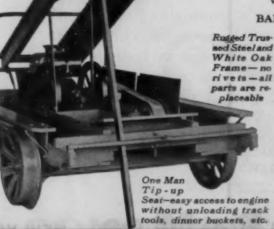
In the words of an executive with 25 years' mechanical experience, ten of these years in charge of purchase and maintenance of all gas engines and cars on a Class A railroad—Fairmont Motor Cars are so popular with railroad men because of:

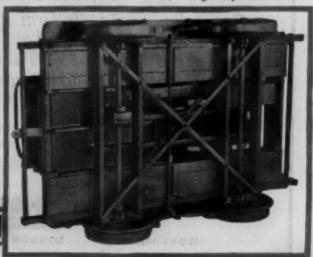
"1-Favorable Initial Cost. 2-Long Life.
3-Low Maintenance. 4-Easy Starting and Operation. 5-Simple. 6-Minimum Moving Parts. 7-Ease of Adjustment and Repair.
8-Water Cooling insures long continuous runs or stationary service. 9-Endless Cord Belt Transmission-low initial cost-freedom from failures - smooth and easy to handle.
10-Low Repair Stock Investment.

#### FAIRMONT RAILWAY MOTORS, Inc. FAIRMONT, MINNESOTA

District Sales Offices
NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO
WASHINGTON, D. C. NEW ORLEANS WINNIPEG, CAN.

BALDWIN LOCOMOTIVE WORKS, Foreign Representatives





240,000 freight

over one piece of track anchored with

## FAIR Rail Anti-Creepers

In Service Since 1922

Expansion Is As Uniform As
When Rail Was First Laid—
Convincing Proof of Their
Permanent Holding Power
and
They Are Still Giving
100% Service

CHICAGO

THE P. M. SO.

NEW YORK

MONTREAL

LONDON

PARIS

CALCUTTA

SYDNEY



The spacious team yard of the Atchison, Topeka and Santa Fe Railway, Chicago, completed 1926. Paved with concrete 10 inches thick.

#### Scientific Planning and Concrete Makes Team Yards Convenient and Efficient

Busy team yards must be ever in service—space between tracks and elimination of "bottle necks" are important. But well planned team yards must be well paved, too. Concrete does it. Smooth, easily cleaned, light colored for economical illumination at night, rugged and unyielding, this modern paving material meets every requirement for heavy hauling.

PORTLAND CEMENT ASSOCIATION

A National Association to Improve and Extend

CONCRETE for permanence

## The Q & C Unlimited Travel Roller Side Bearing

re a p ti

A side bearing with a free roller that will assure the body and truck bolsters being independent of each other at all times.

A side bearing that through continuous operation will reduce wheel and rail wear to a minimum and give your equipment a greater ton mileage and reduce derailments. With this type roller side bearing clearance need not be maintained, for the harder cars get down the easier they roll. This is due directly to the unlimited free rolling motion.

The wear parts, being made of the best high carbon steel, give the bearing even longer life than your cars. They are made for all classes of rolling stock, for new or old equipment. Your investigation is invited.

THE Q & C COMPANY
90 West St., New York
Chicago St. Lou

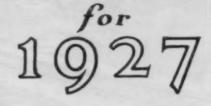
The Unlimited Travel feature allows the roller to turn at all times regardless of its position in the housing or the relation between the body or truck bolsters.





## RACOR

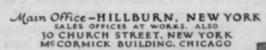






In the years that have passed Ramapo Ajax Corporation has played a leading part in making better track accessories a recognized railway necessity. It has made important contributions to the development of these accessories, looking always to the future and anticipating in advance transportation needs for heavier wheel loads. Ramapo Ajax Corporation has earned a name for quality, performance and tested values, that to many railroads means maximum operating efficiency at minimum maintenance.







RAMAPO-AJAX-ELLIOT
HILLBURN, NEW YORK
NIAGARA FALLS, N.Y.
CHICAGO, ILLINOIS
EAST ST. LOUIS, ILL
PUEBLO. COLORADO
SUPERIOR, WISCONSIN
LOS ANGELES, CAL
NIAGARA FALLS, CANADA



STYLE Nº 17



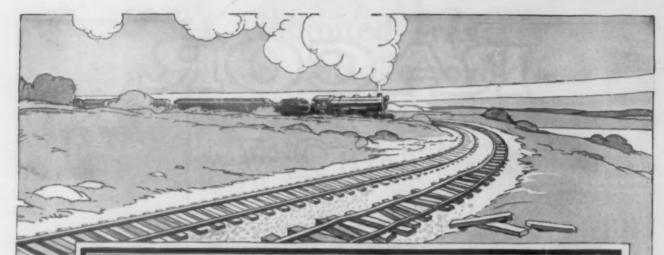


FIG. 3813



RAMAPO AJAX CORPORATION

FIG. 3821



## Maybe you're on the wrong track

If you have anything to do with doors that slide—heavy doors or light ones—you know that the door-hangers run on metal tracks. If the track is wrong the doors don't work properly.

Richards-Wilcox door-hardware—hangers, brackets and track—is so well-made, so carefully and scientifically designed, that when it's properly installed it works right; almost never gives any trouble. We know it's right.

Lately we've been getting trouble calls; and when we send an engineer to straighten things out, he finds that the job has been "botched" by putting up some other track than ours. There are cheap substitutes being made, and sold to unwary buyers who care more for an extra profit than for an honest value to a customer.

The hangers and brackets have our trade-mark and name stamped on them; so has the track we make. It isn't a real Richards-Wilcox job unless our name is on the hangers, brackets and track.

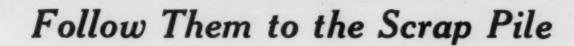


You'll avoid trouble by being sure of our mark. Look out for any attempt to sell you anything else. The guarantee does not apply unless hangers, brackets and tracks are Richards-Wilcox.

## Richards-Wilcox Mfg. Co.

AURORA, ILLINOIS, U.S.A.

New York Boston Philadelphia Cleveland Cincinneti Indianapolis St. Louis New Orleans Chicago Minneapolis Kantas City Les Angeles San Francisco Omahs Seattle Detroit Montreal - RICHARDS-WILCOX CANADIAN CO., LTD., LONDON, ONT. - Winnipes



If you really want to know whether or not your shovels are giving good service—follow them to the scrap pile. There you will find each shovel's record written plainly on it.

There you will see which shovel bent or broke under the strain and which wore out honestly from hard and useful service. To assist you in checking up on the service given by each Red Edge Shovel we stamp on it the date it left the factory.

A short while ago we assisted a big Southern railroad to make a survey of its scrapped shovels and incidentally learned some interesting facts about Red Edge.

In a big heap of 3029 Red Edge Track Shovels we found the following:

Totally worn out	and	usec	for	g	rass	cı	itte	rs	before
that tough first inch	of b	lade	had	go	one		-		2581
Broken blades	23		-		-	-	-		
Broken straps			-	-	-	all	-	-	
Broken handles	190	-	-	-	~	-	-	-	448
					,	Го	tal		3029

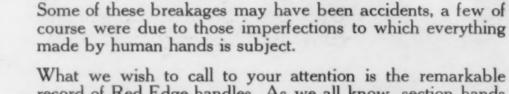
In other words we found that out of 3029 Red Edges fewer than 450 had failed to give that service which American railroad men have come to expect of Red Edge Shovels. Ninety per cent of the entire lot were two years old or over.

RED EDGE
SHOVELS

No. 251 Treck Shovel

> We spent 50 years learning to make one grade of shovel

Made by THE WYOMING SHOVEL WORKS, Wyoming, Pa.



What we wish to call to your attention is the remarkable record of Red Edge handles. As we all know, section hands are particularly rough on shovel handles. And certainly the men on this road are no exception to the rule.

During our survey we saw men at work raising rails and ties with their Red Edges and one husky sitting on his shovel to pry up a tie while his buddy tamped beneath it. Evidently those boys had learned to have confidence in the toughness of Red Edge handles.

It's funny how often we hear a railroad man say that such and such are good shovels except that their handles break. We know a car that is all right except that the engine is poor. But we aren't buying any.

We will admit that we had an awful time finding a handle that would last as long as a Red Edge blade, but we did find it.

If you are one of those who believe handle breakage is a necessary evil, just turn one of your section gangs loose with some Red Edges.

## WYOMING RED EDGE

LOCOMOTIVE SCOOPS

We spent 50 years learning to make one grade of shovel

Made by THE WYOMING SHOVEL WORKS, Wyoming, Pa.

No. 261

# Quality

Why do you insist on buying springs on a price basis rather than on a quality basis?

Why attempt to save a few cents on a spring, the failure of which, may cause the breakdown of a product worth many dollars?

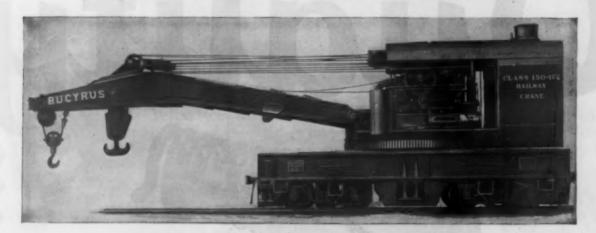
When buying springs, consider the source as well as the price.

AMERICAN STEEL & WIRE COMPANY

Chicago New York Boston Birmingham Dallas Denver Salt Lake City U. S. Steel Products Co.: San Francisco Los Angeles Portland Seattle

Springs

### Muscles of Steel



## For The Wrecking Crew

Bucyrus Railway Cranes lift greater tonnages in proportion to their weights.

They have greater stability, power and speed!

Comparing railway cranes ton for ton of weight, Bucyrus Cranes have greater stability.

The engines are three feet lower. The principal weight of the side frames and engine is 3 to 4 feet farther back.

In addition, Bucyrus Cranes have the power and speed for heavy wrecking and construction

They have the quickness and handiness essential for yard and light wrecking service.

They are constructed with the "safety first" idea-all working

operations are amply safe. guarded against accidents and mistakes.

And you can rush them anywhere over the road at a higher rate of speed.

If you want to strengthen your wrecking crew, the Bucyrus Class 160-171/2 and Class 150-171/2 Cranes can furnish the muscles of steel.

Bulletin 0-1003 tells you all about the lifting ability, stability, power, and speed of these Cranes. Write for a copy. A penny post card brings it.



The Bucyrus Class-50 Spreader Plow

This machine operates effectively with ordinary line pressures of air as low as 50 lbs.

For ditching, shouldering, building embankments, plowing snow and ripping out ice, this spreader is virtually indestruct-

It weighs approximately 70 tons-has a spread as wide as 23 feet, 5 inches—has a vertical 23 feet, 5 inches—has a vertical wing travel of 43 inches; 19 inches above and 24 inches below the top of rail—and a Draw Bar Push Capacity of 100,000 pounds.

Booklet S P 502 tells you all about this Spreader Plow. Send for it.

Bucyrus Company, South Milwaukee, Wisconsin

TOKYO

LONDON

# A Logical Choice





The above views show the very latest conception of what the Roberts and Schaefer Company, long experienced in this specialized line of engineering and construction, consider is the best engineering and operating practice in the design of a large six track 2000 ton storage capacity Locomotive Coaling and Gravity Sand Handling Plant.

We have just completed this facility at Portsmouth, Ohio, one of the busiest points and largest terminals on the Norfolk & Western Railway System. We invite any one engaged in railroad operation or plant construction to inspect this facility and the work that we have done, with the feeling that the impression that will be created will be in our favor.

This plant stands 135' o" high, and the 2000 ton solid poured pocket is 55' o" in diameter, being equipped with duplicate Simplex 150 ton per hour automatic electric roller skip elevating equipment, with screening features for stoker coal, and gravity handling throughout for the sand, eliminating compressed air.

IT IS WELL TO SEE OUR DESIGNS BEFORE BUILDING

ROBERTS AND SCHAEFER CO.

# JORDAN SPREADER





The Composite Spreader-Ditcher Type
—An All-Year Machine

THE Jordan, with attachments, is an all-the-year-'round machine. Indispensable in railway maintenance and construction. A labor- and timesaver on public works. Also used in mines and at plants.



# Illinois Central Installs 30,000 feet of VENTO

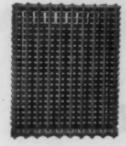
In the round-house, shops and power house of Markham Yards, Illinois Central Railroad, 30,000 feet of VENTO Cast Iron Heaters have been installed.

VENTO Heaters are becoming more and more popular because they bring so many advantages and yet cost less.

Their efficiency and durability have been proved by thousands of installations in every part of the world.

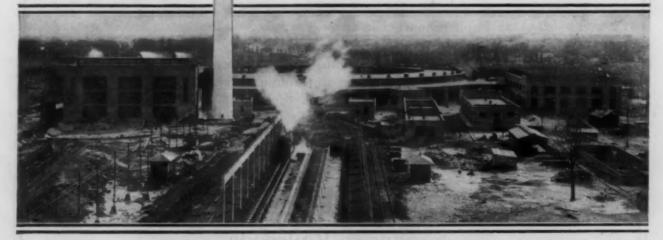
In replacing other forms of heaters, where employed as tempering or reheater units, VENTO Sections have ended all freezing difficulties.

Send for new, revised edition of "Engineers' Data Book on VENTO", a compilation of the most thorough tests ever applied to Blast Heaters.



A typical stack of VENTO Cast Iron Heaters

Bird's-eye view of Markham Yards, Illinois Central Railroad Company. Kehm Bros., Heating Contractors.



VENTO DEPARTMENT:-816-820 S. Michigan Avenue, Chicago

"Makers of IDEAL Boilers and AMERICAN Radiators for every beating need. For burning bard or soft coal, coke, oil and gas."

Showrooms and Sales Offices: New York, Boston, Providence, New Haven, Newark, Philadelphia, Baltimore, Washington, Richmond, Buffalo, Pittsburgh, Cleveland, Detroit, Cincinnati, Atlanta, Chicago, Milwaukee, Indianapolis, St. Louis, St. Paul, Minneapolis, Omaha, Denver, Kansas City, San Francisco, Los Angeles, Seattle, Toronto, London, Paris, Milan, Brussels, Berlin.



# It used to live on a what-not

BEFORE the famous last gold spike was driven into the completed Union Pacific, asbestos had stepped from the curiosities on the parlor what-not to take its place in industry.

In those days of Johns-Manville's beginning, its development was pioneered with a few simple products and a world of faith.

Today thousands of asbestos products roll away from the car sidings of seven Johns-Manville factories. And all through the specification lists of the railroads themselves you will find the words "Johns-Manville Asbestos."

JOHNS-MANVILLE INC., 292 Madison Ave. at 41st St., New York

Branches in all large cities. For Canada: Canadian Johns-Manville Co., Ltd., Toronto

## JOHNS-MANVILLE

Service to Railroads

# In bidden corners where Stee meets

No structure is stronger than its details. It is in such out-of-the-way corners as that pic-tured below that corrosion is likely to start.



In hidden corners corrosion works unseen - here a tough, durable shield of pure red-lead is more than ever important

ORROSION is a constant menace to all steel work. But there are certain out-of-the-way places where the danger from corrosion is multiplied, where unusual care must be taken if the metal is to be kept intact.

Inside latticed beams, the underside of steel footings, lapped plates, the interiors of built-up columns-in such hidden places corrosion often gets its start. And if these parts are weakened, the strength of the entire structure may be threatened.

Surfaces that will be in contact should receive heavy coats of pure red-lead. These surfaces must have the best possible protection.

Parts of steel structures that will be exposed, but inaccessible after erection for painting, should also receive special care. Three heavy coats of pure redlead should be used on all such parts before they are assembled.

#### 179 Engineers endorse red-lead

Pure red-lead is the accepted paint of the engineering profession. Wherever there is metal to protect, engineers are almost unanimous in their use of this protective paint. This fact was proved by a questionnaire sent to representative engineers in all branches of the profession.

Two hundred and six engineers answered the questionnaire. And 179 of them-85%-said they use, specify or recommend pure red-lead for metal protection.

There is no better red-lead than Dutch Boy redlead. You can get it in paste or liquid form. The liquid comes in the natural orange-red for next-tometal coats, and also in greens, browns and black for finishing coats. The paste is obtainable in the orange-red and can be shaded to dark colors.

We maintain a special technical staff to help in the solution of painting problems. Write them in care of our nearest branch.





#### NATIONAL LEAD COMPANY

New York, 211 Broadway
Buffalo, 116 Ouk St.
Cincinnati, 659 Freeman Ave.
St. Louis, 722 Chestnut St.
Pittsburgh, National Lead & Oil Co. of Pa., 316 Fourth Ave
Philadelphia, John T. Lewis & Bros. Co., 437 Chestnut St.

DUTCH BOY RED-LEAD





KAW BOILER WORKS posing & Siding



HAT ARMCO Ingot Iron is rustresisting-that it gives longer service at lower cost per year-is evidenced by these installations. In each instance the durability of this pure iron more than justified the initial investment.

THE AMERICAN ROLLING MILL CO.
Middletown, Ohio

Expert: The ARMCO International Corporation
Cable Address: ARMCO, Middletown



BAILY BURRUSS MIG.CO



- ROOFING & SIDING ~ CONVERSE BRIDGE & STEEL CO Chattanooge, Tenn. Erected NII

Roofing & Siding
LLINOIS CAR CO
Urbana, Ohio

Write for "Engineering Dept. Uses for ARMCO Ingot Iron"

CO INGOT IRON
The Purest Iron Made



A track like this causes high maintenance costs.



After spraying with

#### CHIPMAN WEED-KILLERS REDUCE YOUR MAINTENANCE COSTS



Atlas "A"

is the standard sedium arcenite wood killer and has been used successfully in this country for fifteen years.

Atlas "N-P"

is a non-poisonous weed killer used extensively the past two years and is recommended wherever a danger of cattle poisoning exists and wherever resistive vegctation such as Johnson, Bermuda or horseEVERY railroad executive wants to improve the condition of his roadway and lower the cost of maintenance.

The surest way to improve the appearance and physical condition of a track is to exterminate weeds in the ballast area. The regular and proper application of CHIPMAN WEED-KILLERS—ATLAS "A" and ATLAS "N-P" — eliminates weeds, costs less and accomplishes better results than hand weeding or other methods of temporary value.

Atlas Service consists of consultation and advice on weed extermination based on fifteen years of world-wide experience.

We recommend the type and quantity of chemical required and the time of application.

We either apply the chemical ourselves or assist your engineering staff in making the application.

The maintenance of a weedfree track thus becomes simple, certain and economical.

We have a staff of experts where particular function is consultation and phytocidal research. Let them answer your questions and help you with your

#### CHIPMAN CHEMICAL ENGINEERING CO., INC.

Sole licensee for Non-Poisonous Weed-Killer Under United States patent No. 1,534,289

Executive Office: BOUND BROOK, NEW JERSEY

Factories

Bound Brook, N. J.

Clearing, III.

Palo Alto, Cal.

Houston, Tex.



MANUFACTURERS OF



Buda All Steel Bumping Post



Buda Rolled Steel Wheel



Buda No. 119 Motor Car



Buda-Clark Track Lines



Buda 80-Ton Ball Bearing Journal Jack



The New BUDA No. 419-truly a "conter land" car.
Ample power and strength, and as yet the easiest car
to handle you may have used



Buda-Hubron Earth Drill



Paulus Hyduty Track Drill



Buda Crossing Gates



Buda-Wilson Drill with Liberty Clamp

Catalogue on request

THE BUDA COMPANY

HARVEY (Chicago ) ILLINOIS

Raffway Exchange CHICAGO 30 Church Street NEW YORK

Railway Exchange ST. LOUIS LONDON

ATLANTA, GA.

\$4 Mission St. \$AN FRANCISCO

# PAILS AND TRACK MATERIALS



PRICE
QUALITY
GUARANTEE
SERVICE

L. B. FOSTER COMPANY competes chiefly on a price basis. It sells at a price which stimulates buyers' preference.

Standard-High Grade-Dependable.

Every shipment backed by an inspection and approval at destination guarantee—also subject to guarantee in service.

Warehouses, Storage Yards complete with Fabricating Machinery-centrally located, facilities unequalled.

Can you afford to place your next order without first receiving FOSTER'S proposition?

L. B. FOSTER COMPANY
PITTSBURGH - CHICAGO - NEW YORK





# ROBERTSON VENTILATORS ~ ROBERTSON SASH STOOD FIRM

WITH buildings all around them reduced to a twisted mass of wreckage... the Municipal Pier Sheds at Miami withstood the fury of the recent hurricane with very little damage. The roof of Robertson Protected Metal (see illustration above), the Robertson Ventilators (with the exception of a half dozen or so struck by flying timbers), the Robertson Sidewall Sash . . . all stood firm. What could offer stronger testimony to the strength and durability of these Robertson products?

Branches in all Principal Cities of the United States For England: H. H. Robertson Co., Mercey Iron, Works, Ellesmere Port, Cheshire.

#### **HHROBERTSON SON SO**

First National Bank Building · Pittsburgh, Pa.

For Canada: H. H. Robertson Co., Ltd., 901 Metropolitan Building, Toronto, and 907 McGill Building, Montreal. Canadian Factory: Saronia, Ontario.

# Hederal Roofs

are permanently serving these

# Great American Railroads

ADE of concrete, the only truly permanent material, Federal Cement Roof Tile are fireproof, freeze-proof, rust-proof. And they are impervious to attacks from gases, smoke and acid fumes.

Federal Precast Concrete Roofs have been giving sturdy, trouble-free, no-maintenance service on American railroads for the past quarter century.

The list includes such railroads as Illinois Central; Chicago & Northwestern; Chicago, Rock Island & Pacific; Pennsylvania; New York Central; Southern Pacific; Wabash; Baltimore & Ohio; Chicago, Burlington & Quincy; Chicago & Eastern Illinois; Grand Trunk; Chicago & Western Indiana; Louisville & Nashville; Union Pacific; Missouri, Kansas & Texas; Cincinnati, Indianapolis & Western; Chicago & Great Western.

other Federal job. Federal Glass Insert Tile, as used on the Union Station Sheds, which are three-quarters of a mile long, interlock and interchange with standard units

In addition, there is the Chicago Union Station, anfor top lighting, thus forming "The Daylight Roof."

> Made, Laid and Guaranteed by the FEDERAL CEMENT TILE COMPANY 608 South Dearborn Street, Chicago, Illinois

### FEDERAL EMENT TILE ROOFS

"For Every Type of Permanent Building"

Are you familiar with the ad-uantages of Federal Concrete Cribbing for retaining walls and embankments? Federal Cribbing has only two units, instead of three. It forms a closed face wall with the fine appearance of good masonry. A one-inch continuous slot as-sures free drainage with no possibility of backfill material filtering through. Complete information will be sent promptly on request.



Strength Where Strength is Needed For Dependable Track—

## Inland Rails and Track Accessories

#### INLAND STEEL COMPANY

38 South Dearborn Street, Chicago

Works: Indiana Harbor, Ind.; Milwaukee, Wis.; Chicago Heights, Ill.
Branch Offices and Representatives: St. Paul, St. Louis, Salt Lake City,
Milwaukee, Kansas City, New Orleans, El Paso

THE GRAYBAR TAG

Eventhing CraybaR

SYMBOL OF DISTRIBUTION

# Ine year old 58 years in business

A YEAR AGO, Graybar Electric came into existence—and with it the Graybar shipping tag.

But behind company and tag were more than half a century of experience; first as Gray and Barton, later as the Western Electric Supply Department, distributor of everything electrical.

Sixty thousand items are the sum total shipped under the Graybartag—the symbol of a distributing service that operates wherever electricity lightens burdens, speeds up work or increases comfort.

Offices in 59 Principal Cities
Executive Offices: 100 East 42nd St., New York

GraybaR

Flectrical Supplies



THE GRAYBAR TAG UNDER WHICH 60,000 QUALITY ELECTRICAL SUPPLIES ARE SHIPPED

## Tighten these bolts with a four-foot wrench

Take a four-foot wrench on a % in. iron bolt and how easy it is to stretch the threads and break the bolt. Put the same wrench on a % in. bolt made from the proper heattreated Interstate Alloy Steel and pull with all your might. When the nut is tight that's as far as it will go. The threads won't stretch and the bolt won't break for the stretching point of the proper alloy steel is more than three times that of iron. Eliminate bolt failures by using an Interstate Alloy Steel.

INTERSTATE IRON & STEEL CO. 104 South Michigan Avenue CHICAGO

Open Hearth Alloy Steel Ingots, Billets, Bars Wire Rods, Wire, Nails, Rivets and Cut Tacks Iron Bars and Railroad Tie Plates

# Interstate Steels

District Offices:

NEW YORK-52 Vanderbilt Avenu DETROIT-Washington Boulevard Building MILWAUKEE-First Wisconsin National Bank Building ST. LOUIS-International Life Building

CLEVELAND-Keith Building ST. PAUL-Merchants National Bank Building

KANSAS CITY-Reliance Building







### YOU MUST BE COMPLETELY SATISFIED

That is our pledge to our clients.

In fact, every coaling station purchased from us—whether it be a small moderate priced facility, or an important expensive project—is designed, constructed and equipped as though our reputation depended solely upon the purchaser being completely satisfied.

There are nearly 600 Ogle Balanced Bucket Coaling Stations on 64 railroads. Each was individually engineered to completely satisfy its particular operating requirements.

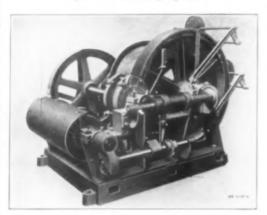
#### OGLE CONSTRUCTION CO.

Coaling Station Engineers
CHICAGO

## What Makes a Coaling Station?



Ogle Coal Delivery Spout



Ogle Automatic Hoist



Ogle Bucket and Loader

If the primary purpose of a modern coaling station is to lower the cost of dependable coaling service, what makes a coaling station fulfill that purpose?

Nine out of ten will answer "Its mechanical equipment."

If you concur and you want your next coaling station to fulfill that purpose, why not equip it with Ogle Balanced Bucket Coaling Station Machinery?

It replaces expensive manual labor with automatic devices that function dependably.

It saves operating power, because it consists of relatively few working parts.

It minimizes maintenance cost, because it is built on the duplicate part basis and sturdily withstands the severe strains of coaling station duty.

It is the product of more than 20 years' experience in locomotive coaling station engineering and is fully guaranteed.

OGLE CONSTRUCTION CO.

28 E. JACKSON BLVD. CHICAGO





# It costs less to erect Railroad Buildings with Celotex ....

RAILROAD men are discovering in Celotex Insulating Lumber a material that offers remarkable speed of construction, ease of handling and economy.

The labor cost of applying Celotex is about half that of building with wood lumber. Celotex is made from the tough fibres of cane into broad, strong boards (4' wide, 8' to

12' long, 7/16" thick), light (about 60 lbs. per 100 square feet), and easy to handle. A few of these big boards cover the same area as many pieces of ordi-

nary lumber. There are fewer pieces to saw, erect and nail. There is less waste to Celotex ... fewer short ends, no cracks, knotholes or stain.

In one supply . . . with one overhead . . . railroads have a handy material that serves as sheathing, interior finish, exterior finish, under plaster (in place of lath), floor and roof

CELOTEX REPLACES WOOD LUMBER as sheathing or exterior finish. The big Celotex boards can be applied for about half the cost of wood. They are light, strong, easy to handle and free from waste





insulation and dozens of other uses.

Because of the greater bracing strength of the broad Celotex boards, it is stronger in walls than wood lumber.

Celotex also stops heat and cold. It resists moisture and quiets sound. Thus Celotex provides substantial buildings that are easy to erect, low in cost and comfortable in all climates.

Many railroads are now carrying Celotex in their division store rooms as a standard material. Our Railway

Service Department will gladly co-operate with your building department in lowering your building costs. For full information, address The Celotex Company, 645 North Michigan Avenue, Chicago, Illinois.

AT LEFT... CELOTEX INDUSTRIAL BOARD is especially made for roof insulation. It is exceptionally economical to lay on any type of roof deck and gives a firm foundation for the roof covering



America's Permanent Lumber Supply

orever...

#### a permanent lumber supply for America's railways

WEST of the Rocky Mountains is more timber that will make lumber than all of the lumber that has been manufactured in the states of Maine, New Hampshire, Vermont, Massachusetts, New York, Pennsylvania, Michigan, Wisconsin and Minnesota since the Revolutionary War. The greater portion of this enormous forest wealth is concentrated in the Douglas Fir forests of the Pacific Northwest-where prolific natural reforestation assures a continuous lumber supply.

Now and forever the Douglas Fir forests of the West Coast will answer the call of America's railways for lumber and big timbers that are strong, stiff and durable; that resist warping and checking; that are light in weight. Every one of the sixty-eight combinations included in the A.R.E.A. structural code, together with special sizes and lengths, always can and always will be furnished on grade.

Douglas Fir offers great savings in car and building construction and to the maintenance of way and signal departments; it lowers maintenance costs as well as operating cost per ton mile. Facts and figures in support of these statements will be furnished on request.

Write for specific information on Douglas Fir. Address, West Coast Lumber Bureau, 5562M Stuart Building, Seattle, Washington.

Typical forest monarchs of the Pacific Northwest Photos by Cress, Seattle Douglas Fir America's Permanent Lumber Supply

Important West Coast Woods

Douglas Fir . West Coast (Sitka) Spruce . West Coast Hemlock . Western Red Cedar



Make us your source of supply

## Duncan Lumber Company

MANUFACTURERS OF STRUCTURAL GRADES, BRIDGE TIMBERS, STRINGERS and CAR CONSTRUCTION LUMBER

PORTLAND, OREGON

Sales Representative: CHICAGO (McCormick Bldg.)
Sawmills at: DRYAD, WASHINGTON

# The Nigger in



—and as a result of our policy to use only high grade creosoted ties, I am pleased to report that we have better track than ever before and our renewals for the past five years have decreased to an average of less than 150 ties per maintained mile.

HERE are some International Grade 3 ties at the Texarkana plant. Note the absolute uniformity and good appearance of these ties. The timber is sound and free from decay. Each tie is graded and the size is permanently marked, according to A. R. E. A. Specifications. Railroads purchasing these ties receive full value in every single tie from an institution that stands for the best in timber preservation. These ties help pay dividends.

WHEN low price is the chief selling argument, look for the nigger in the woodpile. You'll probably find him in the form of decay, overgrading, poor seasoning or skimped treatment.

The difference between good and bad ties is far-reaching and is reflected in the balance sheet. Examine the records of annual tie renewals of the country's leading railroads. Some great systems have annual renewals of 125 or less ties per mile, while others, with similar conditions and with tie treatment in effect for the same period, renew as many as 225 ties per mile. This difference means a loss of about \$275.00 per mile of track per annum.

Furthermore, decayed ties are practically worthless and overgrading one size represents an overpayment of 10 to 30 cents per tie. Such practices do not help pay dividends.

International Creosoting

General Offices

and

Gal

Plants-Texarkana

# the Woodpile

HERE is an actual photograph of other ties set out for sale to the railroads. Note the lack of uniformity of these ties and big decayed sections. Some are graded No. 5, No. 4 and No. 3, when they are virtually rejects, and the decayed ties are practically worthless. The railroad purchasing these ties is not getting full value. The maintenance department is seriously handicapped and cannot keep track in good condition economically. These ties delay dividends.

HEN you purchase ties, do you make a safe, long time investment in high grade creosoted ties, or do you just buy ties. Almost any tie will give service for a few years, but it is service after that time that determines the soundness of your investment.

The remarkable endurance of International Ties pays big dividends in the form of long life, reduced maintenance cost, fewer renewals, minimum track disturbance and added years of dependable service.

Experience proves that inferior ties, even though treated, give only 6 or 7 years' life—but sound, scientifically treated *International* Ties give from 18 to 20 years' life or more.

International now has high grade Standard Specification Ties ready for shipment. To pave the way for bigger dividends, your inquiries are solicited and orders will be carefully and promptly executed.

#### and Construction Co.

Galveston, Texas
Beaumont Galveston

ng



—our maintenance costs keep climbing all the time—yet we pay less per tie than any of our neighbors.



### PRESERVING VALUES

The cost of timber is steadily increasing and the necessity for extending its life and thus preserving its value bécomes ever more important.

Proper selection from our own large holdings of standing timber, expert production by an organization of experienced and skilled men, and scientific seasoning are your assurance that A & L timber will give the greatest service possible to obtain from timber in its natural state.

To still further extend the life and increase the value of timber, we operate five large modern treating plants manned by an organization thoroughly versed in timber treatment. We use the highest grades of preservatives obtainable and furnish a certificate guaranteeing the quantity and quality of the preservative used.

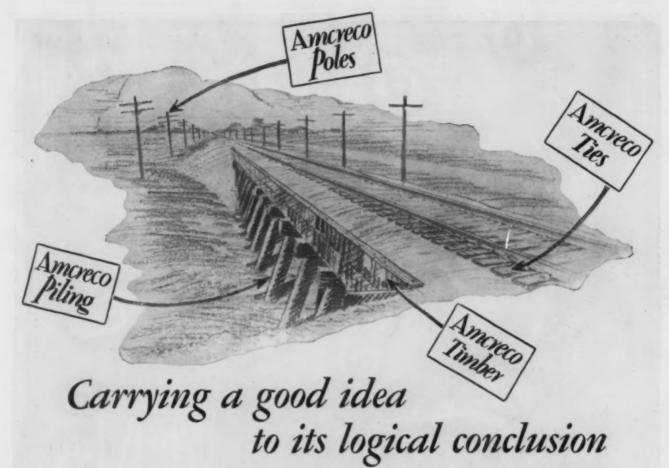
AYER & LORD TIE CO.

Railroad Cross Ties Lumber Poles



Bridge Timbers Car Stocks Piling Posts

"FROM THE TREE TO THE JOB"



AGENERATION ago, if an American railway officer adopted creosoted timber he had to take it on faith. Even a decade ago it was hard for him to justify his judgment with conclusive proof, but today records of test ties, bridge timber and piling have supplied ample evidence of the economy resulting from preservative treatment.

If the use of creosoted ties, piling and bridge timber has proved to be a good idea, as it has, why not carry this idea to its logical conclusion? What argument can be advanced against the universal use of products that pay big dividends in savings?

Many leading roads *bave* followed this line of reasoning and are demonstrating in practice the soundness of their judgment. There is no longer any reason for waiting to "see how creosoted timber stands up." It has proved its merit. Why not adopt Amcreco treated ties, poles, piling and timber and take advantage of the maximum economy in timber preservation?



#### AMERICAN CREOSOTING COMPANY

COLONIAL CREOSOTING GOMPANY



GEORGIA GREOSOTING GOMPANY

LOUISVILLE ~ KENTUCKY



# Newman Brand

BEGINNING with the tree, we first carefully select and cut from our own extensive timber preserves only choice virgin growth. Exercising equal care throughout every stage of milling, seasoning and grading, puts a full one hundred cents to the dollar value in every stick of "Newman Brand" lumber.

Each year more railroads seek this value—a value further enhanced by tremendous resources, milling capacity—reserve stocks and distributing facilities.

In the matter of car building and repairing, lumber of special size and quality, delivered at short notice is a demand that "Newman" service has never failed to meet. Look for the "Newman" Mark.

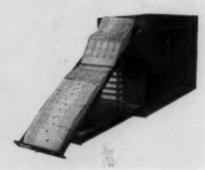
## J.J. Newman Lumber Co.

General Sales Office, BROOKHAVEN, MISS.





ACME is the oldest and largest company in the world specializing exclusively in visible record aquipment — doing that; one thing and doing it well! That's why Acme offers you twelve distinct points of superiority. There are Acme offices in principal cities. Consult your thone divectory.



# "How much stay-bolt iron has No.1 Shop used this month?"

The Purchasing Agent asked the Chief Storekeeper, who turned to the visible control-records at his elbow.

"Well, we bought  $2\frac{1}{2}$  tons the 3rd and they had used 24 hundred-weight up until last Saturday. That leaves us 26 hundred-weight, of which 10 went to No. 2 shop. Our balance is 1600 pounds on hand."

You can have fully detailed, accurate information like that instantly at your command if your records are kept on Acme Visible Equipment with its twelve points of superiority. Such records are so simple that they almost keep themselves.

Their information is signaled in color, outstanding, comprehensible at a glance.

There is an Acme man ready and waiting to discuss with you the advantages that Acme Purchase and Stock Control Records offer you in your business. Or, if you prefer, we will gladly send you our new book, "Profitable Business Control," which is new, just printed, and covers these subjects very interestingly.

Checking the coupon will bring you the Acme man, the book, or special information—any or all, as you wish. Without obligation, of course.

# ACME VISIBLE RECORDS

ACME CARD SYSTEM COMP.	
116 South Michigan Avenue, Chic Gentlemen:	ago
You may send me your book "Profitable Business Control"	You may send your nearest representative to see me.
Please write me concerning your system for handling	records,
Name	***************************************
Firm Name	
City	State

# Hayward Buckets



LABOR saving machinery such as Hayward Buckets was never so necessary as it is today.

One man and a Hayward Bucket is the kind of a "gang" many railroads employ for unloading ballast and similar rehandling work, as well as for the more difficult tasks of digging, coaling locomotives, cleaning ash

pits, and hundreds of other iobs.

Let your experiences of 1926 be put to constructive use. Helpful suggestions from Hayward Engineers may show you how your experiences can be capitalized for the good of your road. Interviews do not cost you anything and may indicate better ways to work in 1927.

THE HAYWARD COMPANY



46 Dey Street,

New York, N. Y.



#### Send for these Bulletins

They picture and describe a great many different classes of work and show why Haywards are being used on these jobs. Your request will start them to youwithout cost or obligation.















# MAGOR



MAGOR improved automatic air dump cars have become an essential tool of production and economy on railroads today. The heavy duty conditions under which dump cars are usually required to operate demand the Magor and these have guided the maker in its development.

The outstanding advantages of Magor improved air dump cars are-

Dumping may be controlled from locomotive or car separately.

Cars may be dumped in either direction instantly and with equal facility, without change of parts or prior adjustment.

Standard equipment to A. R. A.

Positive action and simplicity in dumping.

Low height of advantage in ditching service.

Special air operating features which facilitate operation with reduced number of parts. Angle of slope in dumped position more than 50 degrees insuring complete discharge.

The most impressive evidence of its superiority is its selection by roads which only consider dump cars from the standpoint of operating and maintenance savings.

Catalog and details on request

MAGOR CAR CORPORATION, 30 Church St., New York, N. Y.



#### TWENTY PRINCIPLE FOR YEARS



30 cu. yd. Extension Side Dump Cars, rip-rapping on a busy main line of the New York Central Railroad.

#### RELIABILITY COUNTS BIG ON MAIN LINES

YOU can depend on Extension Side Dump Cars to discharge quickly and safely the large boulders necessary for a good job of riprapping.

There are no traffic delays—because the cars operate on the balanced principle. The loaded car bodies move easily to full dumped position and the down turned door permits the unobstructed discharge of the entire load. The cars close automatically upon release of the air pressure and cannot be left helpless in open position if a break should occur in an air hose.

Extension Side Dump Cars will be furnished in any cubical capacity from 20 to 50 yards, level full or approximately 28 to 70 yards normal leading.

#### CLARK CAR COMPANY

BALANCED DOOR DUMP CARS

PITTSBURGH, PA.

SAN FRANCISCO

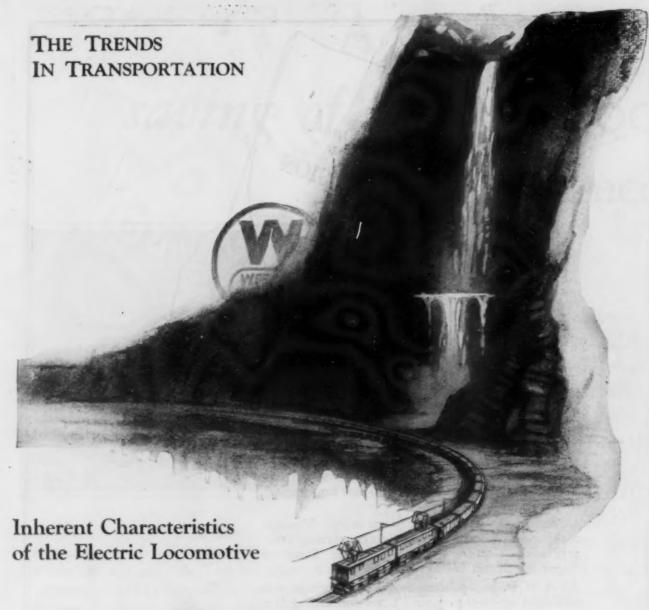
CHICAGO

RICHMOND, VA.

PITTSBURGH

BOSTON 683 Atlantic Ave





# Regeneration

ONE of the most interesting and important advantages of the Electric Locomotive is its ability to regenerate on down grades. Regeneration means the ability to handle the train down the grade at safe speeds without the use of air brakes, at the same time utilizing the energy available, otherwise dissipated as heat in the brake shoes, to deliver electrical power back into the overhead distribution system for use of other electric locomotives.

Westinghouse Electric & Manufacturing Company

East Pittsburgh Pennsylvania

Baiar Office of St Poncyel Cities of

Westinghouse



# As you turn these pages

You are not prompted by idle curiosity, nor are you seeking entertainment for a few unoccupied moments.

Unknowingly, you exemplify our story. You are seeking and gaining information concerning your profession—quite logically—in the Business Paper which has been created to serve it.

An A. B. P. paper, such as this one, brings you unbiased up-to-the-minute news concerning the trend of professional activities. It supplies you with organized knowledge and tested ideas, scientifically gathered and sifted by leaders in your phase of business.

Its knowledge is nation-wide and pertinent. The quality of its information—both editorial and aditorial—is governed by its pledge to consider first and foremost your interests and to maintain the high standards of practice in all phases of its activities.

Through habitual reading, you will reap full benefit from this, your business paper.

THE ASSOCIATED BUSINESS PAPERS, Inc. Executive Offices: 220 West 42nd St., New York, N.Y.

A.B.p

An association of none but qualified publications reaching the principal fields of trade and industry.

## A

# saving of \$3,000,000 in long distance charges

J,	N.Y.	CHI	StL	SanF
NY.		340	405	11.30
СНІ	<sup>s</sup> 340		<sup>8</sup> 145	°8.25
StL	405	145		<sup>\$</sup> 7.80
SanF	<sup>6</sup> 11.30	\$8.25	<sup>8</sup> 7.80	

In addition to these nation-wide rate changes, several new service conveniences are offered. The privilege of "reversing the charges," for example, formerly applied only to person-to-person calls. This has now been extended to include station-to-station calls—a substantial saving and a real convenience to thousands of business men.

Those who wish to take advantage of the lowest long distance rates of the twenty-four hours may now do so beginning at 8:30 P. M. From this hour to 4:30 A. M., station-to-station rates are

By the recent readjustment in long distance rates, it is calculated that telephone users will save \$3,000,000 annually. Interstate and intersectional rates are substantially lower. The greater the distance, the greater the reduction. Here are typical station-to-station day rates, old and new: New York to Pittsburgh, formerly \$2.10; now \$1.70. Chicago to Boston, \$5.45—\$3.95. Atlanta to San Francisco, \$13.65—\$9.40.

about fifty per cent of day rates. Now, more than ever, long distance calls are useful in the development of business. Thousands now use the telephone nationally. By telephone you can make a week's trip in a few minutes. Is there a distant call that would clear up some trouble-some transaction? It probably would cost less than you think. . . . Number, please?

#### BELL LONG DISTANCE SERVICE



# TELETYPE

# Has Made Good With These 6 Great Railroads

TELETYPE, the telegraphing typewriter, has proved its worth in an outstanding way by satisfying the exacting requirements of the Union Pacific, Santa Fe, Burlington, New York Central, Pennsylvania and Illinois Central railroads.

Any of them will tell you that Teletype is unsurpassed for handling car passing, freight and passenger reports and other wire detail speedily, accurately and economically.

Teletype prints its message accurately in from 1 to 100 places at the same time.

Teletype can be used on telegraph wires or be superimposed on existing 'phone circuits. Moreover, it can be Duplexed or Multiplexed to send from 2 to 8 messages simultaneously on the same wire.

Investigate this speedy, accurate, economical means of handling wire detail. We'll gladly supply further information regarding Teletype on request.

MORKRUM-KLEINSCHMIDT CORPORATION
1410 Wrightwood Avenue
CHICAGO





At the left is the machine that sends the message, operating precisely like a typewriter. A the right is the machine that receives the message, printing it accurately on the ordinary typewriter page.

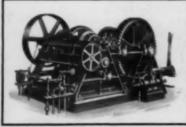




#### One responsibility

A hundred railroads today knowthe value of placing entire responsibility for coaling station construction in the experienced hands of Fairbanks-Morse engineers. Designed, built and equipped by Fairbanks-Morse—this specification has been their assurance of dependable operation and low maintenance cost. Over 600 Fairbanks-Morse coaling stations are now in service in every part of the country. Let us tell you about them.

500-ton reinforced concrete coaling station built for the E. J. & E. R. R. at Wankeran, Ill



A skip-hoist that provides for every emergency. This unit is used in the above coaling station. Write for descriptive bulletin.

# Coaling Stations built throughout by

**FAIRBANKS-MORSE** 





# Only the two-stroke-cycle Diesel has these advantages—

It was because the advantages listed here can be obtained only in a two-stroke-cycle engine that the two-cycle design was chosen for the first heavy oil engine built by Fairbanks-Morse. And it is because the value of these advantages was established from the outset, that Fairbanks-Morse has steadfastly held to the two-stroke-cycle principle in building more than a million horse-power of Diesel engines.

Obviously, when the Diesel assumed greater commercial importance, the practical side of Diesel operation began to receive more attention than the theoretical side. The man who buys a Diesel to operate his machinery is more interested in year-round operation than in engineering pros and cons. If an engine is easier to operate, costs less to maintain and still gives excellent fuel economy, that engine is destined to triumph. Thus the two-

stroke-cycle principle came swiftly into favor.

The million horsepower of F-M Diesels have been the great force behind this trend toward two-stroke-cycle design. Starting when the Diesel was young, Fairbanks-Morse has step by step perfected the two-cycle engine. In keeping with the idea of maximum simplicity, mechanical or airless fuel injection was adopted along with the two-stroke-cycle and this too has been steadily developed into the present highly perfected two-stage combustionanother factor that adds to simplicity and the dependability that always goes with it.

In selecting a Diesel engine, start with a comparison of Diesel principles. This will lead you directly to the two-cycle engine. Then select the Diesel that represents the two-cycle principle at its best. In the opinion of thousands, that Diesel is the Fairbanks-Morse.

 All complicated, mechanically actuated valves in cylinder head eliminated.

-No complicated rocker arms, push rods and timing gears.

-Fewer moving parts and therefore reduced maintenance.

-Simpler to operate.

-No valves to grind, no timing or setting required.

 A power impulse during every down stroke of every piston and therefore more uniform power delivery.

-Rated on conservative basis without excess weight per horsepower.

Ask for Bulletin 1020 which contains an interesting comparison of Diesel engine principles

FAIRBANKS, MORSE & CO., Chicago
28 branches in principal cities at your service

#### FAIRBANKS-MORSE

**DIESEL ENGINES · PUMPS · MOTORS** 

APA21.1





#### That never-coming Tomorrow!

The old English landlord who used the sign shown above, did not give away free ale. As each day came, it was always "tomorrow" that his promise would be fulfilled.

You may have promised yourself to buy new machine tools, to rid yourself of obsolete equipment "tomorrow."

There may be many reasons why you cannot buy today the tools you should have. But what is to prevent you from finding out today—from taking the first step which is to make a cold-blooded survey of your tool equipment.

Make a list of each major tool you have. Against each one put the date the machine was new or the date you installed it. Send this list to us (and to other machine tool builders if you choose) and permit us to tell you how much more production you could get from the latest machine tools.

If there is not a big enough and clearly-

seen margin of profit in changing to a modern tool, you have lost nothing but gained the peace of mind that comes from such knowledge.

Should we be able to prove you could save a considerable amount by the installation of one or two new tools for obsolete tools you have, then you will know what you are losing and when the time is opportune, you can make the change.

Know if there is a "hole in your business pocket." Know whether it is large enough to lose occasional dimes or big enough for many dollars to drop through annually.

We will be of any service we can in helping you to determine the value of your present tool equipment.

Don't wait until "tomorrow." It will never come. Make up your list today or write to us for a machine tool expert to go over your line-up of tools.

#### Niles-Bement-Pond Company, 111 Broadway, New York

Divisions of NILES-BEMENT-POND COMPANY

THE NILES TOOL WORKS COMPANY, Hamilton, Ohio RIDGWAY MACHINE COMPANY, Ridgeway, Pa.

NILES GEAR COMPANY
III Broadway, New York

PRATT AND WHITNEY COMPANY, Hartford, Conn. NILES CRANE CORPORATION, Philadelphia, Pa.

## SELLERS

#### Builders of Machine Tools for Railroads, such as-

Boring and Facing Machines for Air Brake and Pump Cylinders

Boring and Facing Machines for Locomotive Cylinders

Boring and Turning Mills

Boring and Turning Mills for Tires and Wheels

Boring and Facing Machines for Driving Boxes

Boring and Facing Machines for Car Wheels

Boring, Drilling and Milling Machines (combined)

Drilling Machines-Multiple

Drilling Machines-Traverse Radial, with two or more arms

Drilling Machines-Radial-Special heavy duty

Drilling Machines-For Rails

Drilling Machines—Portable—Horizontal

Grinding and Pointing Machines for Drills

Grinding and Shaping Machines for Tools

Lathes for Car Wheels

Lathes for Locomotive Driving Wheels

Lathes for Turning Axles

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Milling Machines—Floor Plate Type
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Planing Machines

Planing Machines for Locomotive Cylinders

Planing Machines for Locomotive Frames

Planing Machines for Plates

Sand Mixing Machines

Slotting Machines

Slotting Machines for Locomotive Frames

Steam Hammers-Single and Double Upright

Live Steam Injectors-For all conditions of service Injector Valves and Strainers **Boiler Washers and Boiler Testers** Steel-Bronze Coupling and Hose Units

Exhaust Steam Feed Water Heater Injectors

## Railroad Concentration

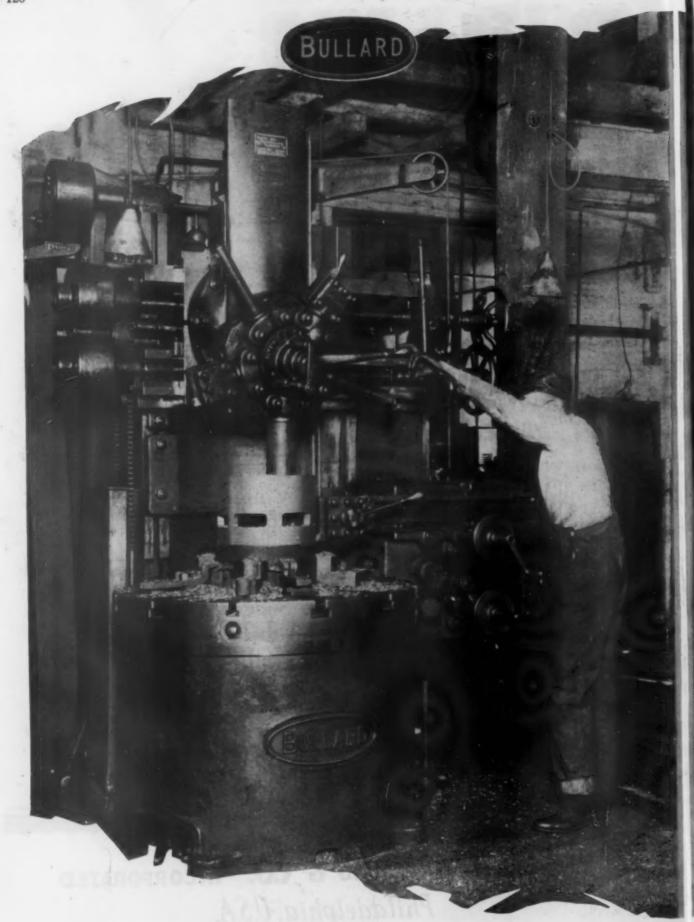
ONE of the established functions of the Sellersengineering staff is a study of railroad machine tool problems.

We invite the co-operation of the railroad shop executives and the men toward improvement of machining methods and reduction of costs.

We appreciate the assistance of these men, and we know they appreciate ours, because we get our full share of railroad machine tool business.

We request your continued interest, and assure you that the Sellers engineering staff will be glad to consider any problem that is confronting you.

WILLIAM SELLERS & CO. Incorporated
Philadelphia, U.S.A.



1

# The Easiest Way To Finance Shop Improvements

MAKE sure that the first new repair units purchased are the ones that will effect the greatest savings—then use these savings to purchase additional equipment.

Accurate records of "Bullard" performance show that the amount of work done on a Vertical Turret Lathe in 1114 hours previously required 2535 hours.

Multiply the time savings by your labor rate and shop expense per hour—then compare the returns on your investment with those offered by other repair units.

You will find that the easiest way to finance your shop improvements is to first invest in a sufficient number of Vertical Turret Lathes.

The Bullard Machine Tool Company Bridgeport, Conn. U. S. A. BULLARD

VERTICAL TURRET LATHES

#### PRACTICAL LUBRICATION SERVICE



# eliminate all you can by using AVON

Sustained Quality Railroad Lubricants

Avon Superheat and Other Cylinder Oils

Avon Car Journal and Engine Oils

Avon Triple Valve and

Compressor Oils

Avon Rod and Driving Journal Compounds

Avon Air Brake Cylinder Greases

Avon Ball Bearing Greases
Avon Gear Compounds

An oil or grease for every purpose

The giant hand of friction holds back every moving part of locomotives and cars. It provides more resistance, may consume more energy than the heaviest load or steepest grade.

Adequate lubrication will overcome this retarding force every mile of the run. Inadequate lubrication means the familiar story of hotboxes, delays, replacements and repair bills.

Eliminate all the friction you can by using Avon Railroad Lubricants under the supervision of Associated lubrication service. These sustained quality products last longer and stand up better—they will help you maintain high efficiency and economy in operation.

#### ASSOCIATED OIL COMPANY

Main Office: 79 New Montgomery Street
San Francisco

# What Birdsboro Can Do For the Railroads

BECAUSE of its complete plant facilities and railroad casting experience, Birdsboro is unusually well-equipped to supply railroad requirements of bolsters, side frames, locomotive frames (edge cast), draft arms and every kind of locomotive and car castings.

In 1927, let Birdsboro quote on your casting requirements.

In the design and construction of improved hydraulic presses, special machinery and equipment for railroad, car and locomotive shops, Birdsboro has co-operated with some of the most prominent roads. The largest locomotive flanging press in the world was designed by Birds-boro's Engineering Staff and built complete in Birdsboro's plant. Incorporating a number of unusual features, this improved and faster-working press has been in the service of a prominent road for more than three years.

When you are considering hydraulic presses, special machinery or other equipment for your shops, Birdsboro will welcome the opportunity to place before your engineers the cumulative railroad experience of Birdsboro's Engineering Staff.

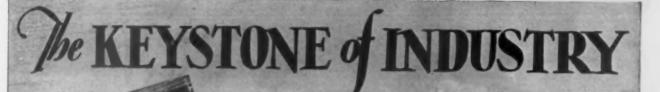
# BIRDSBORO STEEL FOUNDRY AND MACHINE COMPANY

#### **DESIGNERS AND BUILDERS**

of hydraulic presses, special machinery and other equipment for railroad, car and locomotive shops. Manufacturers of all kinds of car and locomotive castings, including bolsters, side frames, draft arms and other railroad castings.

Forging Ingots Hydraulic Operating Valves Belt Lacing Machines

**BIRDSBORO, PENNSYLVANIA** 



## TRANSPORTATION

Just as transportation by rail, boat, truck, etc. is the keystone of the industrial structure, so transportation by locomotive crane, hoist, etc. is the keystone of shop operation.

Without adequate transportation, big production in any shop is impossible for ninety per cent of production is transportation. Without dependable transportation no shop can maintain the production schedules of which it is capable. Without economical transportation no shop can get its costs down where they ought to be.

Is your plant adequately equipped with cranes? Are they dependable? Do they operate at minimum cost? If any of your answers are negative, our engineers can render you a real service in studying your needs and making recommendations. No obligation, of course.

Bulletin 200 describes Whiting Cranes in detail.

WHITING CORPORATION
HARVEY · ILLINOIS
[CHICAGO SUBURB]

# CRANES for shop efficiency



#### Engineers

And

#### **Fabricators**

Specify Riveting as a

Riveted Seam

Has a

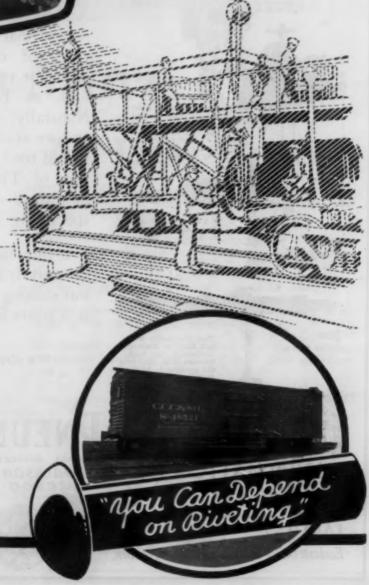
Known Calculable Strength

Machinery and methods used in riveting have practically eliminated the necessity for skilled workmen. Workmen may, under test, make other types of joints which are satisfactory but which in general practice are lacking in uniformity.

#### Hanna Riveters

Set each rivet with a predetermined tonnage produced irrespective of the judgment and skill of the operator.

HANNA ENGINEERING WORKS 1765 ELSTON AVE., CHICAGO, U. S. A.





#### PNEUMATIC TOOLS



#### REPUTATION

A reputation is not built up over night. You realize that in your own business. It takes years of conscientious effort and honest endeavor to build up an enviable reputation such as THOR Pneumatic Tools enjoy. Naturally, we are proud of that reputation and we zealously guard against anything that would tend to destroy or weaken the reputation of THOR Tools. And this is your guarantee of satisfaction when buying or specifying THOR Pneumatic Tools.

We illustrate but a few tools that are used extensively in railroad work. Let us send you our catalog which shows our complete line—it is yours for the asking.

We also manufacture the World's Famous
Thor Electric Tools

#### INDEPENDENT PNEUMATIC TOOL CO.

PNEUMATIC TOOLS 600 W. Jackson Blvd.

ELECTRIC

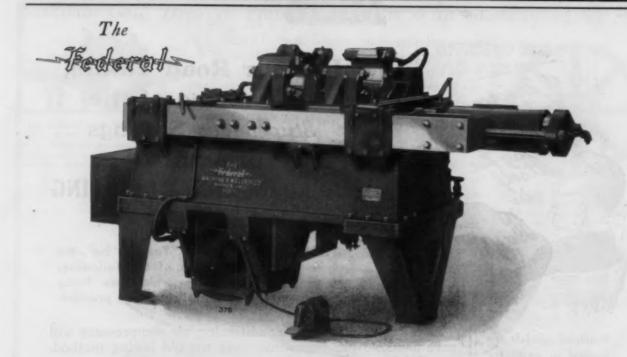
FACTORY AURORA, ILL.

Eastern Office 1463 Broadway, New York



BRANCHES THE WORLD OVER

London Office 40 Broadway, Westminster, London.



#### **Produces More Flues-**



#### ADVANTAGES

Handles flues and tubes from 2" to 6" diameter.

Water cooled pressure clamps adjustable for different size tubes.

Copper alloy composition dies which can be changed in 10 minutes.

Horizontal alinement of stationary clamps permit alinement of parts to be welded.

Carriage slides out of range of flash or "throw-off."

#### At Less Costs!

THE "Federal" type No. 92 Butt Welder is supreme in the efficient and economical safe ending of locomotive flues and tubes.

It eliminates fire building, thereby saving the labor involved, and makes every hour a productive one.

It saves fuel by using heat only when making a weld and by concentrating it at the point to be welded.

It saves labor by discarding flue tests as less than onetenth of one per cent leak when applied.

The smooth surface of the finished weld speeds application and lengthens the life of both flues and flue sheets.

Before changing over your equipment write to the recognized leaders in the development and construction of resistance welders of all types—Bulletin No. 92-66 gives all information regarding flue welding equipment for railroad shops.

#### The Federal Machine & Welder Co.

MAIN OFFICE AND WORKS LOCATED AT

Warren, Ohio, U.S.A.





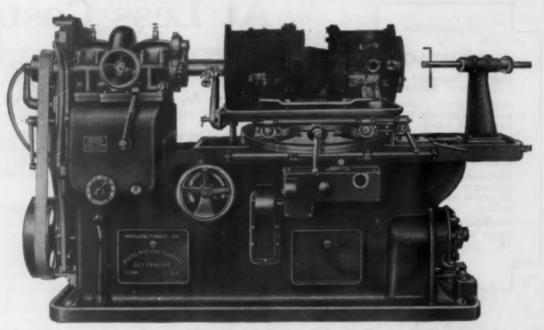
# Is Your Road Taking Advantage of the Stupendous Savings Inherent in MICRO INTERNAL GRINDING

?

Whether you can answer "Yes" or "No", we invite your consideration of the following, almost startling figures which are being proven daily in actual railroad shop practice.

Railroad officials are invited to write for cost charts substantiating these figures. The Micro Method of reconditioning air compressors will save .0003743 per pump mile over the old boring method. The Micro will grind 600 pumps per year. On an average yearly mileage per pump of 100,000 miles, the installation of a Micro Internal Grinder will save \$22,458.00 per year.

"Grind one cylinder, swivel the fixture 180° and grind opposite cylinder in perfect alignment."



Model "F.G." Micro Internal Grinder. Approximate Net Weight 8,000 lbs.

#### MICRO MACHINE COMPANY

Factory and General Offices: BETTENDORF, IOWA

#### Alaskan Gold Dredged From The Depths With Gears of Alloy Steel



Upper tumbber of cast NICKEL-CHROME STEEL, having a tensile strength of 90,000 to 115,000 lbs. with minimum elongation in 2 inches of 20%. Mfd. by The Columbia Steel Curp. of San Francisco, Cal.

WHERE "sourdoughs" once searched river beds for glittering nuggets, 5,000,000-pound dredges now send down their endless chains of buckets. As these buckets are dragged along the stream bed and brought dripping to the surface, tremendous stresses are set up in the tumblers and bull gears.

At these points where stress is greatest—where there must be wear-resistance combined with great strength, toughness and fatigue-resistance—Alloy Steel is used to insure the dependable operation of the equipment.

Why not let our engineers demonstrate where YOU may use Alloy Steel to effect new economies in manufacture and maintenance?



Large buil gear wheel of cast NICKEL-CHROME STEEL made for an Alaskan Gold Dredge by The Columbia, Steel Corp.





HE INTERNATIONAL NICKEL COMPANY, 67 WALL STREET, NEW YORK CITY.
Producers of INCO Nickel in all commercial forms



#### CHICAGO-CLEVELAND CAR ROOFING CO.



#### It's profit insurance—



A leaky car roof is not only a nuisance—it is a positive menace to profits. A shipper's bill for damages may "eat up" the car's earnings for months. But there is no need of such a calamity. There is one roof that doesn't leak. It is our



The Magic Clamp

.11.

#### VIKING ALL-STEEL ROOF

1/16" galvanized steel sheets extend clear across the car without a break under the running boards. Scientifically designed, Viking Roof has attained its popularity because its merits are so self evident it commends itself instantly to common sense. Its use proves its ability to "deliver the goods."

A score of America's leading railroads now use Viking. Ask any user for an experienced opinion.

45 Years' Experience Back of VIKING Roof

#### CHICAGO-CLEVELAND CAR ROOFING CO.

**BRANCHES** 

Washington, D. C.

St. Paul

Warren, Ohio

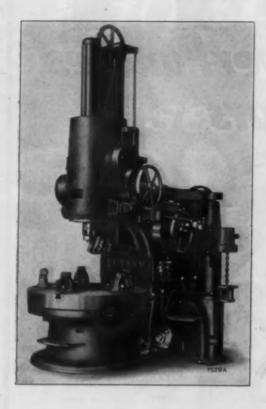
General Offices

25 E. JACKSON BLVD.

**CHICAGO** 

**OUR PRODUCTS** 

Inside Roofs
Outside Roofs
All Steel Roofs
Composite Ends
Steel Carlines
Uncoupling Devices





#### PUTNAM 48" Car Wheel Borer

HEAVY DUTY TYPE

Recent developments of our Putnam Works embodying the latest in design.

Particular attention has been given to liberal proportions. Of ease and convenience of operation. Rapid Power Traverse in either direction to both boring and facing spindles with control in each case by one lever. Either pneumatic chuck or automatic chuck can be furnished to suit customer's preference.

You may care to take advantage of the services of the Company's Staff of Advisory Engineers — if so, write to Machinery Headquarters.

Shaw
Electric Cranes
"Putnam"
Machine Tools
"Ashcroft"
Gauges
"Hancock"
Inspirators and
Valves
"Consolidated"
Safety Valves
"Metropolitan"

Manning, Maxwell & Moore, Inc.

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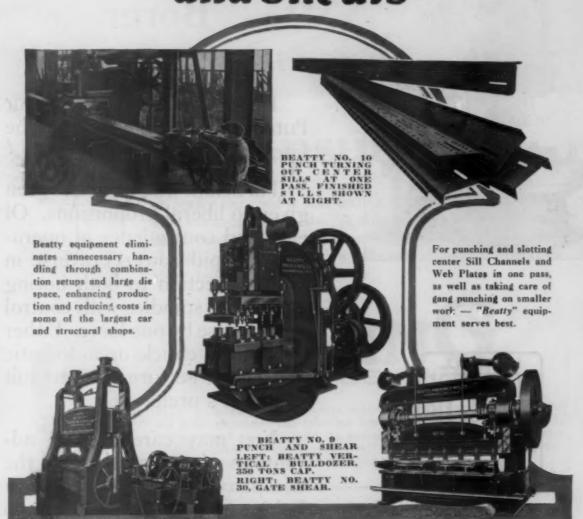
Birmingham Boston Buffalo Chicago

Cloveland Detroit Philadelphia

Works: Muskegen-Fitchburg-Bridgeport-Boston

Pittsburgh San Francisco Scattle St. Louis

# BEATTY Modernized Power Punches and Shears



#### For Rapid and accurate Production work on Structural Steel Shapes and Pressed Steel Parts

The "Beatty Line" comprises as many different types of machines as there are Punch and Shear Requirements.

When in need of Punches, Shears, Presses, Dies, Bulldozers or Portable Cranes, let "Beatty" solve your problem!

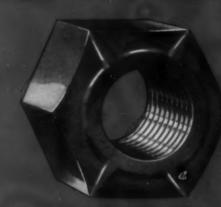
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BEATTY MACHINE & MFG. CO. HAMMOND INDIANA



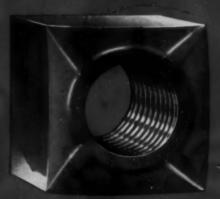


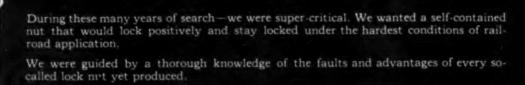
# after 5 3 years search we present SELFLOCK UNIT NUTS





"The Nut with the





After discovering the unique scientific principle of the Selflock Unit Nut, we tested and experimented with it for years before putting it on the market.

Today it is a thoroughly proved and perfected product—a nut that will keep a tight unyielding grip regardless of the most racking vibration. It locks on every thread.

GRAHAM
BOLT AND NUT COMPANY
PITTSBURGH, PA.

ESTABLISHED 1874



# SELFLOCK UNIT NUTS

hold tight under all conditions of vibration no matter how severe

> Your Railroad can Profitably Use Selflock Nuts on

- 1 Locomotives
- 2 Rolling Stock
- 3 Track Bolts
- 4 Frog and Crossing Bolts
- 5 Shop Machinery and Equipment

"They lock on every thread"





Write for particulars—
Graham Bolt and Nut Company
Pittsburgh, Pa.

#### O'MALLEY-BEARE VALVE CORPORATION

ANNOUNCES

A COMPLETE RE-ORGANIZATION

OF

#### O'MALLEY-BEARE VALVE COMPANY

THE CORPORATION WILL CONTINUE THE MANUFACTURE OF THE MULTIPLATE AND OTHER TYPES OF VALVES AS MANUFACTURED BY O'MALLEY-BEARE VALVE COMPANY AND HAS ESTABLISHED A DEMONSTRATION SERVICE WHICH IS AVAILABLE TO USERS IN ASSISTING THEM IN SOLVING THEIR VALVE PROBLEMS. THE CORPORATION HAS DISCONTINUED THE MANUFACTURE OF BRASS ENGINE CASTINGS AND JOURNAL BEARINGS AND WILL SPECIALIZE IN THE MANUFACTURE OF VALVES AND FINISHED PARTS.

#### O'MALLEY-BEARE VALVE CORPORATION CHICAGO

BRUCE P. OWENS. VICE-PRESIDENT

217 RAILWAY EXCHANGE

Schaefer Loop Hanger and Clevis Attachment for brake beams.



Safety in performance.

Ease of inspection.

Convenience in application.



Schaefer Loop Hangers are drop-forged without Welds.

The section of the cross members is increased 50%, this additional material also provides Reinforcement at the bends.

They are perfectly squared, a requirement of the utmost importance in brake hanger manufacture. A properly squared hanger insures even stress across entire brake head and side frame bracket surfaces which means lengthened life of both hangers and attachments.

Each hanger is heat treated and oil quenched.



The clevis used in this construction is simple in design and of sturdy proportions. It has ample surface in its contact with the side frame and entirely eliminates side frame wear.

Schaefer Hangers are built to give car life.





Schaefer Equipment Co.

A Good Brake Beam Suspension prolongs the Life of the Brake Beam.







A perfect brake beam hanger must be square at the point of bearings, must have legs of equal length, must be free from flaws in bending and must provide strength where it is needed at the Bend.

Schaefer Brake hangers meet these requirements and in addition are made from wear resisting steel and are heat treated and oil quenched.

A Good Brake Hanger is the Cheapest, available, Safety Assurance.



Schaefer Equipment Co.







Schaefer Drop-Forged Body Levers are made in all sizes to meet your new equipment requirements.

They are 30% lighter than the solid type and with increased strength.

Provides even stress conditions throughout the entire lever.

Accurately made of wear resisting steel.

Every lever alike both as to size and strength.



Schaefer Attachable Jaws

A grip strong as the rod. Drop forged from special steel.



Sheave Jaw

Provided with sufficient opening for various sized Sheave wheels.



#### Schaefer Equipment Co.



Schaefer Truck Lever Connections are made from a special section of wear resisting steel.

Drop forged from one piece, without welds.

Over one million cars are equipped with Schaefer Connections.

To get the full benefit of reduction in weight of foundation brake gear parts, Schaefer Connections and Levers should be included in the truck layout.

We carry in stock a full line of sizes commonly used, including A.R.A. Standard in both connections and levers.



#### Schaefer Equipment Co.

## A Locomotive Can Haul

## SKF

THIS was once a favorite axiom of railroad men and locomotive designers.

With the advent of auxiliary starting units and the thoroughly proved ESF journal bearing, this conception must be reversed.

Power at speeds becomes the limiting factor and new locomotive design should recognize this important point.

Starting resistance on passenger trains has been reduced by ESF journal bearings to a fraction of what it once was. Moreover, the dependability of this bearing is so fully established as to be unquestioned.

Keep bearing progress in mind when designing new power that must run for years to come.

1743

5KF Industries, Incorporated,

## ul Anything It Can Start"



Plain journal bearings carry the load on an oil film. But the oil film is temperamental. It is susceptible to a lot of conditions that have no effect on ESSF journal bearings.

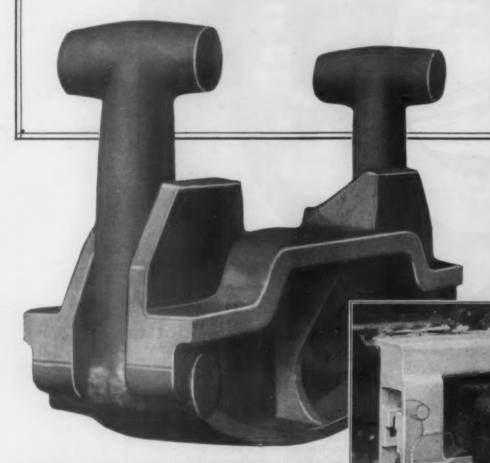
Variations of temperature, speed and load affect the plain bearing. Method of packing, condition of packing, presence of foreign matter and scores of other variables influence the action of the oil film. It is uncertain at best.

In the ESF journal bearing the load is carried on a metal to metal contact between rollers and races. The variables that affect the plain bearing do not disturb the ESF bearing. The is why it is always dependable.

ed, 165 Broadway, New York City

### Reducing Side Thrusts

The swinging carry iron of the Union Centering Device permits frictionless side motion of the coupler. This reduces car body side thrusts and wheel flange wear.



#### UNION METAL PRODUCTS CO.

NEW YORK CHICAGO PHILADELPHIA ST. LOUIS
WASHINGTON RICHMOND HOUSTON
SAN FRANCISCO KANSAS CITY
MONTREAL



#### Controlled Tendencies

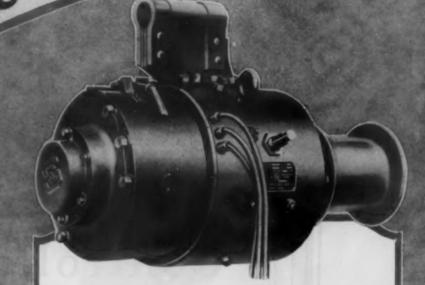
When the load from tipple or shovel strikes the gondola drop doors there is a tendency to distort them. Ajax Corrugated Doors have more than twice the strength of flat plate doors.

#### UNION METAL PRODUCTS CO.

New York Chicago Philadelphia St. Louis Washington Richmond Houston San Francisco Kansas City Montreal

CORRUGATED DROP DOORS

# Reduced Weight and



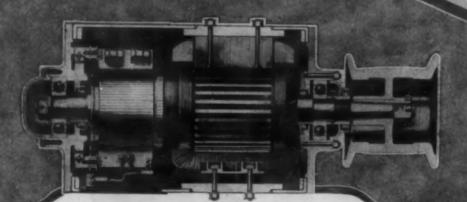
#### 10% Less Weight

THE MAGNET FRAMES on Safety L Car Lighting Generators are now being made of drawn steel in place of cast steel used previously. This change makes a much neater looking generator and reduces the weight 50 lb. or approximately 10%. The lighter weight frame is a big aid in handling the generators in the shop. The drawn steel frame has greater uniformity of metal and because of its lighter weight provides increased belt life.



SAFET

# Improved Constructi



#### Interchangeable

A LL THE SAFETY FEATURES of interchangeable parts have been retained with the drawn steel frames. With three frames and six armatures it is possible to assemble six machines of different capacities varying from one to four kilowatts. All machines fit existing suspension frames. One size shaft, one size bearing and one type brush and brush rigging will fit all machines.

The Safety Car Heating and Lighting Co.

NEW YORK CHICAGO ST. LOUIS BOSTON PHILADELPHIA SAN FRANCISCO MONTREAL



CAR LIGHTING EQUIPMENT



# TIMEN Tapered Roller

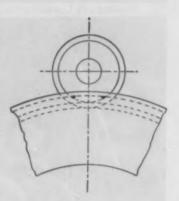
# Modern Bearing Advance Positive Roll Alignment

Thrust, radial, speed and shock capacities of any bearing mountings can be increased. Space can be saved. Design and assembly economies will develop. Precision and output will be higher. Friction will approach the vanishing point. That is the net of Timken POSITIVE ROLL ALIGNMENT, the one fundamental modern advance in bearings.

Each roll in a Timken Bearing yields full possible load capacity, with negligible friction, because each roll is always correctly aligned by positive mechanical means. Two areas of contact with the rib of the cone project the roll infallibly along its predetermined axis. The cage ceases to be a factor in alignment, merely spacing the rolls!

Such advanced design, typical of Timken talent and facilities, has won leading manufacturers and users of every type of machinery. Throughout the Industries, Timken Bearings are today a vital issue in engineering, production, and sales. Complete Timken data should be before you.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO





### Another "Big Parade"



Hauling Baggage



Inside Box Car

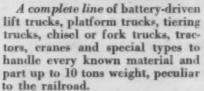


A Big Load of Pig with 10-Ton Tructor



Loading and Unloading Cars

#### Why an Elwell-Parker



An engineering survey service to determine to a certainty the particular type recommended will perform its expected service to the complete satisfaction of the depart-

ment requisitioning it.

A follow-up service after installation that assures the operator is getting the utmost out of his machine and that it is receiving the necessary attention to guarantee the longest life for the equipment and the greatest saving for the investment. Parts are furnished for every tructor built during the past

twenty years.

Backed by a concern which manufactures tructors exclusively and devotes the entire energy of its engineering staff to the study and solution of haulage problems in and about railroad shops and terminals and industrial plants in twenty-three countries.

Elwell-Parker equipments produced under these conditions bring with them a value well known to every user.

Surveys made on request. Offices in principal cities.





In the Freight Terminal



5-Ton Lift Tructor



Rail Crane in Yard



Pushing Lumber Cars



In Railroad Shop



Up Steep Incline



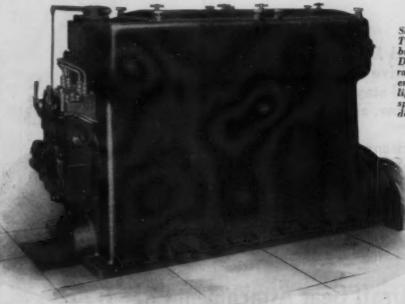
completes

THE turn of the New Year of 1927 marks the fortieth anniversary of The Foos Gas Engine Company. Forty years of leadership in building high quality internal combustion engines exclusively! Forty years in which Foos has constantly contributed improvements of outstanding merit! During these two score years, Foos has produced four important units in the field of internal combustion engines, including the Foos Type T gas and gasoline engine, the Foos Type V Heavy Duty gas engine and the Foos Type R Heavy Duty Diesel engine. All have become acknowledged leaders in their field. And with the advent of Diesel engines for mobile and semi-mobile equipment, Foos has blazed the trail by developing the Foos Type L Diesel, with a wide range of versatile uses—among them a positive generator hook-up for Diesel-Electric railway service.

40 years of constant service

### The Foos Gas Engine Co.

Springfield, O., U. S. A.



Shown at the left is a Foos Type L Diesel especially built for railway service. Develops higher R. P. M. ratings than any other Diesel engine made with relatively light weight—and less floor space and head room. Fully described in bulletin B-707.



For 39 years, Foos has built high quality internal combustion engines exclusively. Types for all gas and liquid fuels.



## HAND BRAKES

That Feel Like The Air Has Been Applied

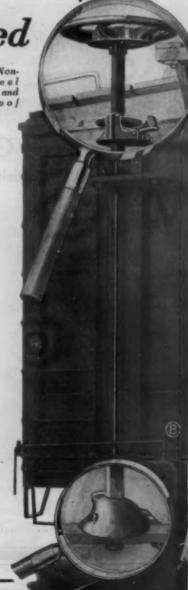
When you give a turn on the "Booster-equipped" hand brake wheel, there's not the hesitating stop effected by the ordinary hand brake. Motion is arrested so rapidly that you think someone has set the air.

Universal "Non-Club Wheel with Storm and Dirt-Proof Ratchet" gives you positive assurance of a brake which will stay in commission regardless of snow, sleet or cinders.

Trainmen can use both hands to grip the wheel and steady themselves. No club required. Operator stands firmly on both feet when releasing brakes doesn't have to raise one foot to kick ratchet free.

#### Universal Draft Gear Attachment Co.

Railway Exchange Bldg., CHICAGO Transportation Bldg., MONTREAL





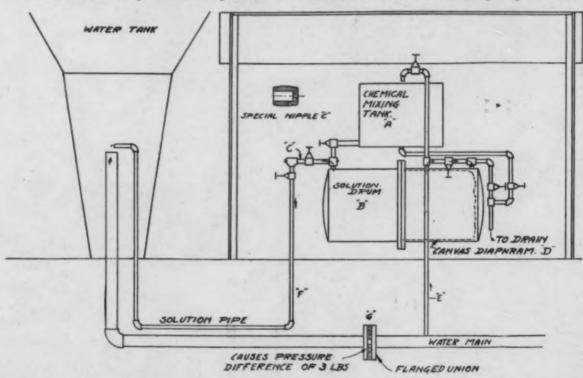


# DECISION TO TREATING PLANTS

#### Bridging the Gap between Laboratory and Boiler

Dearborn Treating Plants assure mechanical accuracy in treating locomotive boiler waters. The treatment prescribed by Dear-

once daily can give it the necessary attention; it is so small that ordinarily it can be housed in a corner of the pump house; and



born Laboratories is thus transmitted regularly to the boilers in the exact quantities recommended, which assures maximum results. The gap of uncertainty due to divided responsibilities and varying "opinions" is bridged.

The plant is so simple in operation that any one whose duties bring him to the tank so inexpensive that one can be installed at each water station on a 250 mile division, for less than one installation of a large lime and soda plant would cost.

Write for our new book on Dearborn Treating Plants just off the press. Consultation is invited.

310 S. Michigan Ave. Chicago Dearborn Chemical Company

299 Broadway



# On 70 New I.C.R.R. Locomotives



The twenty new mountain type passenger locomotives ordered by the I.C.R.R. and built this year by the American Locomotive Company are Syphon-equipped.

This three Syphon arrangement adds 97½ square feet of heating surface to a normal firebox and combustion chamber surface of 336 square feet.

Dynamometer car tests conducted by the Illinois Central have demonstrated that Thermic Syphons reduce fuel consumption over 15% and greatly increase the efficiency of locomotives so equipped.

The fifty new 2-8-4 type freight locomotives built this year by the Lima Locomotive Works are Syphon-equipped.

This two Syphon arrangement adds 98 square feet of heating surface to a normal firebox surface of 284 square feet.

These and more recent orders bring the total of Syphon-equipped locomotives on the I.C.R.R. up to 368.

Consultation invited.

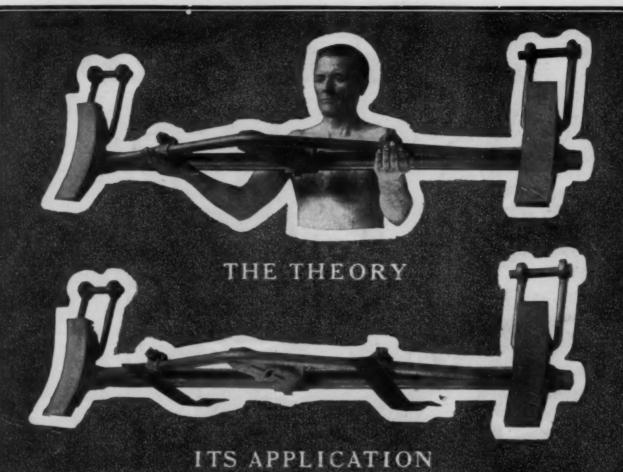
Locomotive Firebox Company

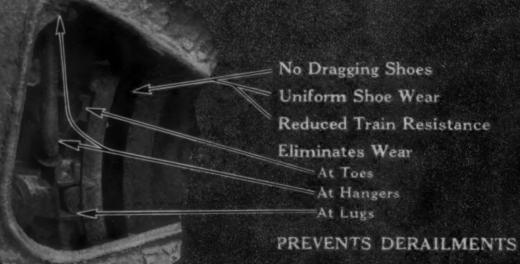


The Heart of the Locomotive"









THE RESULT



BRADFORD

Quality First

## BRADFORD



## Three Important Factors In Car Maintenance Economy

DRAFT GEAR, Bolster and Brake Beam—three vital car parts determining the safety of operation and cost of maintenance.

So excellent has been the performance of those manufactured under the Bradford line that they are acknowledged by leading railroad men to be among the most important factors in car maintenance economy.

Bradford Draft Gears have never been found wanting—they are not only built to meet present day service conditions but can be depended upon to take care of future requirements for many years without attention or maintenance.

The Huntoon Truck Bolster employs a built-up construction noted for its great strength, light weight, and reliability—performance records prove that it will stand up in any class of service without failing.

In the Huntoon Brake Beam railroads have found the answer to all their brake beam problems—its unique design insures safer brakes, increases braking efficiency and reduces repair costs.

It pays to standardize on the Bradford line.

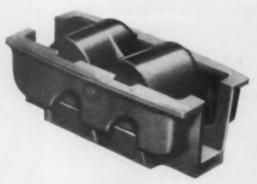
#### THE BRADFORD CORPORATION

NEW YORK 25 West Forty-third St. CHICAGO Railway Exchange

Service Always



Side Bearings



DESIGNED
for heavy equipment
SELF CENTERING
with unlimited travel
SELF CLEANING
LONG LIFE
All wearing surfaces
Tempered in oil

Save Wheels Save Rails

THIS is the age of bigger and better cars, bigger and better locomotives, why not bigger and better Side Bearings? Instead of perpetuating a Side Bearing designed at a time when cars were one-half the present capacity.

Wine Side Bearings are made to suit the design and capacity of all types of cars.

They are especially designed for heavy freight equipment and locomotive tenders and present an economical means of keeping your cars on the road.

Investigate the savings

The Wine Railway Appliance Co.

Toledo, Ohio

Peoples Gas Bldg., Chicago, Ill.



### Save Tonnage Save Coal

THIS is the season of large coal haulage on many roads and constitutes a large part of their revenue.

The demand for coal, however, is at the terminals, and not all equipment delivers its full tonnage—unless it is equipped with efficient door locks.

Wine door locks are saving thousands of tons of coal from being scattered along the right of way and lost as revenue.

They are especially valuable on large equipment and insure an economical means of keeping your tonnage in the cars. Door Locks



INEXPENSIVE
low on maintenance
SIMPLE
only three parts
SAFE
to unload
DEPENDABLE
keeps doors tight

you can effect

igs

## The Wine Railway Appliance Co.

Toledo, Ohio

Peoples Gas Bldg., Chicago, Ill.

Louisville & Nashville Railroad Co.
Southern Pacific Co.
Chicago Union Station Company
The Reading Company
A. T. & S. F. Railway Co.
D. L. & W. R. R. Co.
Wabash Railway Co.
Central Vermont Railway

## Dependable





THE LONG-LIFE, TROUBLE-FREE, POWER-FULL BATTERY

## Service and Easy Upkeep

This battery is built so rugged that it keeps going strong with a minimum of attention

MORE and more railway men are learning that electric industrial trucks equipped with Exide-Ironclad Batteries are the most efficient means of handling freight.

There is just one reason for this—the dependability of the Exide-Ironclad Battery. This battery is built rugged to stand the wear and tear of hard usage. Except for recharging, it will stay on the job for years with practically no attention.

The secret of this steady dependability of the Exide-Ironclad lies in its construction. The cell jars and covers are made of Giant Compound, a practically unbreakable material. The cell connectors are flexible straps of lead-plated copper, and will not crystallize and break under vibration.

Both positive and negative plates are built extra-strong, and are equipped with feet which rest on ribs at the bottom of the cell. In addition, the positive plate is of a special tubular construction which keeps the active material in place and retards its loss—thus giving the battery longer life.

But the Exide-Ironclad has other qualities which recommend it to the electric industrial truck owner. It has plenty of power to easily carry extra-heavy loads over the roughest going. It is unusually economical on charge. And it keeps your industrial trucks and tractors mov-

ing fast in afternoon as well as in the morning.

These qualities make this battery a most profitable investment. The following extracts from actual letters are typical examples of the service that Exide-Ironclads are giving to present users:

"Regarding the service of the Exide-Ironclad Batteries used in connection with our industrial trucks, we have used these same batteries in our trucks nearly four years, ten hours a day, six days in the week. As near as we can tell, these batteries are still as capable of imparting as much energy, for as continuous a period, as when first installed. We consider them 100% efficient, and can not speak too highly of the satisfactory service they have given."

"Regarding the Exide Batteries which we use in our two electric shop trucks, one of these batteries was in use from February, 1916, to February, 1923—7 years' continuous service—and was then overhauled and is again in daily service. The other has been in service since 1918 and is still being used daily, no repairs having been made on this battery."

If you are not using these cost-cutting batteries now, we will gladly send you full information on request. Ask for booklet "Facts for consideration in selecting a Storage Battery"—Form No. 2865.



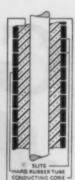
The Exide-Ironclad positive plate

The plate consists of a metal grid from which extend parallel metal conducting rods, each surrounded by active material and cased in a slotted rubber tube. This plate is rugged, durable and has extremely long life.



Cross-section of

Showing how the rubber tube retains in place and retards the loss of the active material of the plate. This insures unusually long life. The alits in the tube give the electrolyte free access to the active material.



THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

## Dependable



Denver & Rio Grande Western R. R. Co.
Chicago & Northwestern Rwy. Co.
Chicago, Milwaukee & St. Paul Rwy. Co.
N. Y., N. H. & Hartford Railroad
Louisville & Nashville Railroad Co.
Southern Pacific Co.
Chicago Union Station Company
The Reading Company
A. T. & S. F. Railway Co.
D. L. & W. R. R. Co.
Wabash Railway Co.
Central Vermont Railway



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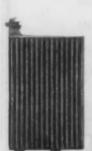
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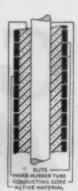
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Exide

Cross-section of

Showing how the rubber tube retains in place and retards the loss of the active material of the plate. This insures unusually long life. The alits in the tube give the electrolyte free access to the active material.



THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto



- 1. A free roller traveling in its natural path.
- 2. Horizontal runways for ease of turning and for constant and minimum clearance.
- 3. Positive positioning relative to the bolster regardless of truck angularity.

Goodwin Side-Bearings meet all these requirements.

Under load the roller rolls in its natural path without flange pressure or flange friction, on a flat hardened plate.

Unloaded it is positively positioned relative to the bolster regardless of truck angularity.

Goodwin Side-Bearings can be depended on to provide proper bolster support at all times and permit free movement of the trucks when trucks should move.

#### Goodwin Side-Bearing Company, Inc.

New York 110 East 42d St.

Chicago Peoples Gas! Bldg.

GOODWIN SELF SPOTTING SIDE-BEARING

## Sessions Standard

REG. U. S. PAT. OFF.



CAPACITY: averages 27 inches to close.

STURDINESS: 21 sq. inches minimum cross section of steel.

AMPLE RECOIL: to insure Positive Release.

TRAVEL:  $2\frac{1}{2}$  inches, all friction and effective. SELF-CONTAINED: no bolts, keys nor cotters.

INITIAL COMPRESSION: both spring and friction.

DIMENSIONS:  $9 \times 12\frac{1}{2} \times 22\frac{3}{8}$  inches. SIMPLICITY: only five different parts.

STANDARD COUPLER COMPANY
New York Chicago

## **GRIFFIN** WHEEL



From the standpoint of both Economy and Safety the CHILLED IRON WHEEL is the ideal wheel for all classes of service.

> LOW COST **MAXIMUM MILEAGE**

#### **GRIFFIN WHEEL COMPANY**

410 N. Michigan Ave.

Chicago, Ill.

FOUNDRIES:

Tacoma

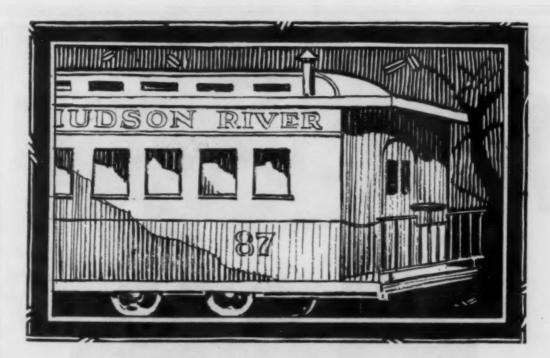
Kansas City

Denver St. Paul Los Angeles

Council Bluffs

Salt Lake City

Cleveland



### Making Good Coaches Better since 1887

This has been our business, for forty years — helping car builders and railroads make good coaches better!

#### Edwards Window Fixtures

-are unobtrusive-often out of sight. But they do much in making good coaches better. They make windows easy to open, easy to close, and safe and quiet at all times.

Catalog W-19 describes them

#### Steel Vestibule Equipment

Edwards vestibule trap doors, and trap door locks and catches make vestibules safe and convenient for loading and unloading-and when the train is in motion as well-Many types.

Catalog H describes them

#### Edwards Metal Sash

The newest product of Edwards of design and manufacture is a complete sash for motor buses, street cars, gasoline and gas-electric cars, and for all passenger coaches in which light weight, simplicity and durability are desired. Send for our new booklet on Edwards Metal Sash.

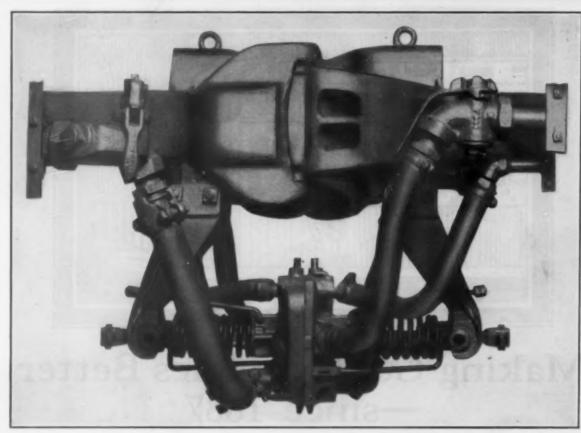
### O.M. EDWARDS CO

NEW YORK

SYRACUSE, N.Y.

CHICAGO

Canadian Representatives: LYMAN TUBE AND SUPPLY Co., LTD., Montreal and Toronto



PASSENGER CONNECTOR COUPLED

### The Consolidated Connector Corporation

MANUFACTURERS OF
THE AMERICAN AUTOMATIC CONNECTOR

118 Noble Court

Cleveland, Ohio

#### **ANNOUNCE**

the completion of their standard automatic connector, which is the last word in hose coupling.

Designed to fully meet every requirement.

The result of careful study and tests, under actual operating conditions.

Hundreds of them in use.

Fool proof. Operates successfully on all classes of equipment and under all track and climatic conditions.

SAFETY coupled with PRACTICAL ECONOMY AND EF-FICIENCY that will save first cost within one year after installation.

Equip one or more trains on your road, test them under your own supervision. The results will convince you beyond doubt.

We are prepared to make prompt delivery and installation.

Write for twenty page booklet.



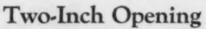


## THE VAPOR WAY

Heat all your cars The Vapor Way;
Proper temperatures night or day;
From Engine-cab to farthest car,
Constant comfort—the best by far;
In weather mild or weather cold,
Regulates with ease untold.
The pipes and traps can never freeze,
Regardless of the cold degrees.

Best System Sold

To Beat The Cold



All The Way Through



No. 208 Stop Valve



No. 275-Engine Conduit



No. 310-Coupler

Send for New Circular on FLEXIBLE METALLIC CONNECTIONS



VAPOR CAR HEATING CO., Inc.

Railway Exchange, CHICAGO





Gas-electric car on Chicago & Alton. Makes 205 miles per day on schedule of 39.3 miles per hr. with



Sechoard dual power plant car with trailers makes 276 miles daily between Abbeville and Atlanta.



Northern Pacific car that makes 225 miles per day with trailer.



Gas-Electric car in operation on the Mexico National Railways

## Making the light-

Systems that have adopted Gas-Electrics
—with G-E Equipment

2 tr

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Chicago & Great Western Northern Pacific Union Pacific Great Northern Mobile & Ohio Missouri Pacific Soo Line Rock Island Maryland & Pennsylvania Chicago & Alton Frisco Lines New Haven M-K-T Burlington National Railways of Mexico Grand Trunk Western Wabash Lehigh Valley Boston & Maine Seaboard Air Line Chicago & Northwestern New York Central (Big Four) Lehigh & New England Baltimore & Ohio

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

Motive Power



Gas-Electric car on the Grand Trunk. Operates between Richmond and Jackson, Mich.—212 miles daily

### traffic lines pay

24 roads are reducing the operating costs of handling light passenger traffic by the operation of G-E equipped gas-electric cars.

86 of these cars are in daily service making an average mileage of 6000 miles a month, more than half of them on main-line runs.

65 of these cars are hauling standard coaches weighing up to 42 tons. Schedules average 25 to 40 miles per hour.

95% of all schedule mileage is performed; and the average operating cost of all the cars in service is less than 40 cents per train mile, including interest and depreciation.

Specify G-E Electrical Equipment as part of YOUR Gas-Electric Motive Power



Frieco gas-electric car operating 192 miles per day between Fort Scott and Cherryville, Kan.



Three locomotives were replaced by this Great Northern car, which makes 320 miles per day with 35-ton trailer.



Gas-electric car on New York Central Lines (Cincinnati Northern). Makes 245 miles per day with 41-ten trailer.



ELECTREC

#### **BUFFALO BRAKE BEAM COMPANY**

MONEL METAL SPRINGS

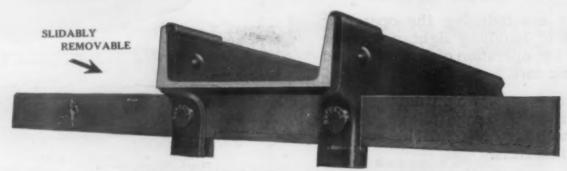


CASE HARDENED PAWLS

BRAKE PIN SELF LOCKING HEAT TREATED



BRAKE HANGER PIN SELF LOCKING HEAT TREATED



AUXILIARY SUPPORT FOR BRAKE BEAMS
WITH
SELF LOCKING—HEAT TREATED PINS

Brake

Beams

Brake

Beam

Repair

Parts

DRAFT KEY LOCK SELF-LOCKING

**BUFFALO** 

Buffalo Brake

Pin

Locks

Buffalo

Self-Locking

Keys for Brake Shoes

\_\_\_\_\_

**NEW YORK** 

HAMILTON, ONT.

## The AC Floating Battery System for automatic railway signaling

combines the reliability of batteries with the convenience and economy of Alternating Current

#### What the AC Floating Battery System Is

The AC Floating Battery System is the most efficient means yet devised for supplying power to railway signals. In operation it is extremely simple. A transmission line carries alternating current throughout the signal system. At each signal function this line is tapped and a charger rectifies the AC to DC. The resulting DC charges a storage battery always on floating charge, that is, the charger is permanently connected to the battery and automatically keeps it fully charged. Power from the battery operates the signal. The battery thus acts as a reservoir carrying a reserve of ample power at all times. In case of failure of the AC line, the battery continues to operate the signal alone.

In other words in the AC Floating Battery System AC current is generated and transmitted to each signal function where it is converted into DC current and held in reserve by the battery which operates the

#### Advantages of the AC Floating Battery System

Two other signal systems are available-DC Signaling and AC Signaling. The advantages of the AC Floating Battery System can be readily made clear by a comparison of it with these systems.

In DC signaling primary batteries are located at each signal function to operate the signal. As long as the battery lasts this system is absolutely reliable, operating independently of any source of power supply. The batteries, however, must be periodically replaced or the signal fails to operate. New power can be brought to the signal only by installing a new battery. This is both inconvenient and expensive.

In AC signaling AC current is used to operate the signals direct. The use of AC current is very desirable because it is economical and conveniently transmitted, one power line supplying the power for all signals. This system is, however, subject to failure, for if the transmission line should be broken or the power station should fail, the whole signal system ceases to function until the damage is repaired.

#### Combines AC and DC Advantages

By providing an unfailing supply of DC power from an AC source the AC Floating Battery System combines the advantages and eliminates the disadvantages of both AC and DC signaling. It uses AC for generation and transmission because of its convenience and economy, and DC from batteries for signal operation because of its reliability and reserve power.

Because it is unfailing in operation this system is used in practically all other industries requiring an infallible, uninterrupted power

#### FANSTEEL PRODUCTS COMPANY, Inc. CHICAGO, ILLINOIS

SERVICE

MODERNIZE YOUR SIGNALING WITH THE AC FLOATING BATTERY SYSTEM

The Balkite Signal Charger in the AC Floating Battery System



Balkite Cell

Unfailing in operation—Has no moving parts—Cannot get out of order—Requires no adjustment or renewals—Has indefinitely long life—Unaffected by weather—over 23,000 in use by 90 railroads.



Balkite Transformer

Successful operation of the AC Floating Battery System dates from the development of the Balkite Signal Charger. It is this charger that made the system practical.

#### Principle of Balkite Charger

The Balkite Signal Charger is based on this fact: If an electrode of certain metals is immersed in an acid solution the metal will permit electrons (atoms of electricity) to flow into the solution, but not out of it. The metal acts as a valve which rectifies the current and permits the construction of a charger without moving parts.

In the Balkite Signal Charger the metal used as a valve is Balkite, which is entirely unattacked by the acid solution. The result is a charger of indefinitely long life.

#### Advantages of Balkite Charger

The advantages of a charger based on these principles are obvious. It is unfailing in operation. The valve action is entirely independent of timing with the alternations of the line. The charger, therefore, requires no adjustment.

Because the Balkite Charger has no moving parts it is practically impossible for it to get out of order. Because of the long life of the rectifying unit it requires no replacements of any sort. Once installed it requires only the addition of water at infrequent intervals to replace evaporation. The cells are made large enough so that it is sufficient if the water is replenished when it is replenished in the battery. It has nothing to wear out or break down.

Because of the peculiar nature of the Balkite valve, which never allows current to flow through in the opposite direction, it is impossible for this charger to discharge the battery. It shows no leakage under a direct current of 50 or 60 volts.

This charger has no inductive hum and therefore causes

absolutely no interference with radio. It is practically unaffected by weather and will operate satisfactorily in weather as low as 25° below zero.

#### Application of the Balkite Railway Signal Charger

Each Balkite Railway Signal Charger consists of two elements:

1. A cell or glass jar (illustrated above), containing a standard sulphuric acid solution in which are immersed two electrodes, one of lead, and the other of the metal Balkite. A metallic salt is added to the electrolyte to increase the efficiency and a film of oil is placed on the electrolyte to reduce evaporation.

 A Balkite Transformer (illustrated above), designed in accordance with A. R. A. specifications, to step down the alternating current to a voltage suitable for use with the charger.

#### Specifications

Both the cells and transformers may be varied in size and wiring to take care of varied conditions. Transformers can be made for any primary voltage up to 550 volts, and any frequency between 25 and 125 cycles. The rectifier cells are independent of frequency within commercial limits.

The approximate limits of the Railway Signal Charger cells are: Up to 3 amps. to not more than 4 cells; up to 1 amp. to not more than 6 cells.

#### In Use on 90 Railroads

Though it was first put on the market less than two years ago, the Balkite Charger has already become standard equipment on 90 leading American and Canadian Railroads. Over 23,000 Balkites are in use today. It is now the standard charger for AC Floating Battery use.

### FANSTEEL PRODUCTS COMPANY, Inc.

RAILWAY SALES AND SERVICE BY

FALLINGY COMPANY

A NATIONAL SALES & ENGINEERING SERVICE FOR RAILWAYS

HATTIGE BAG. 10 Church Street

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MODERNIZE YOUR SIGNALING WITH THE AC FLOATING BATTERY SYSTEM

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## An Old-time Standard

Over Thirty Years at 705 Olive Street Saint Louis

### Serving American Railways

"Interlox"
Floor Clips

"A. R. A. Standard Plus" Cast Steel Wedges "Interlox"
Forged Steel
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### Western Railway Equipment Co.

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## The Best Appliances

for their specific service

"Western" Angle Cock Holders

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## Railway Devices Company

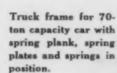
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#### DALMAN TRUCKS made by SCULLIN STEEL CO., St. Louis

Dalman trucks have additional single elevated end springs, thus providing sufficient standard A.R.A. spring coils to eliminate destructive shocks.







Same as above with springs removed.

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Each Additional Year Added To A Car's Life Pays The Entire Cost Of Good Draft Gear-

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#### TUCO Flexolith

Floors for all Types of Steam and Electric Passenger Equipment Cars and Motor Buses



Over 45,000 Flooring Installations in passenger vehicles. This preeminent position in the transportation world is the reward of Tuco Quality and Service. Tuco Floors have met the most gruelling and exacting demands in all types of passenger cars and buses.

Tuco Flexolith Special H. W. Mixture, the outgrowth of 25 years' experience in car floor work is light in weight and increases the strength of the floor structure. It make a smooth permanent floor, is fireproof and sanitary. Flexolith has a safe and pleasing non-slip tread in any kind of weather and is supplied in colors to harmonize attractively with any scheme of car or bus decoration.

#### TUCO PRODUCTS CORPORATION

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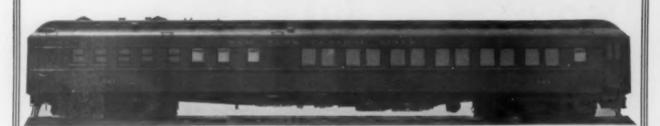
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## Passenger Cars

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# PULLMAN CAR & MANUFACTURING CORPORATION

General Offices: Chicago Ill. Works and Foundries: Pullman, Ill. Michigan City, Ind.

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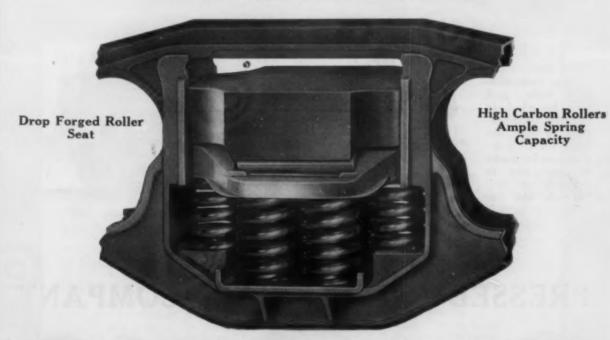
Side Bearing Arch Equipped with—

Hardened Steel Roller and Pin, Cover Plate and Grease Cup.

#### Combination Side Bearing and Arch

#### THE "BARBER" TRUCK

Lateral Motion Device Applied to Dalman Side Frame



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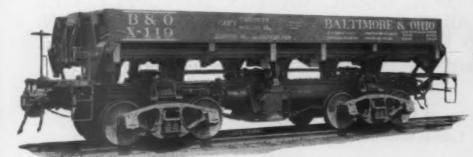
Federal Railway Device Co. New York

## Koppel Automatic Air Dump Cars

The Most Complete Line of Air Dump Cars on the Market

Cars can be furnished either of drop door type or with doors lifting up and where lift door car is used apron can be provided for throwing load a greater distance from edge of track if desired.

All Koppel cars dump automatically to either side without changing any parts, but can be locked so they will only dump to one side if desired.



KOPPEL CARS in service have demonstrated that they pay for themselves in a very short period through labor and time saved.

20 Cu. Yd. Drop Side Type Built for Baltimore & Ohio R. R.

We invite the closest comparative tests and will be glad to furnish information so that an investion so that an investion can be made of our car in service, or will furnish car for trial.



30 Cu. Yd. Lift Door Type, Built for Great Northern Rwy.

Complete information furnished upon request

#### PRESSED STEEL CAR COMPANY

Owners

KOPPEL INDUSTRIAL CAR & EOUIPMENT COMPANY

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# PENNSYLVANIA FREIGHT CARS AND TANK CARS



#### TANK CAR LEASING

More than 6,000 "Pennsylvania" tank cars are in lease service to the leaders of industry. Following are some representative users:

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Attractive terms on time contracts are offered for all classes of liquid freight.

#### PENNSYLVANIA TANK LINE (Lessors of Tank Cars)

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The freight cars and tank cars shown on this page are products of an experienced organization with complete car building facilities at three strategic points-Sharon, Pa.; Kansas City, Kan., and Beaumont, Texas.

The services offered comprise building, rebuilding, converting and repairing—either tank cars, or freight cars in wood, composite or steel.

#### PENNSYLVANIA CAR CO.

(Car Builders)

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New York St. Louis

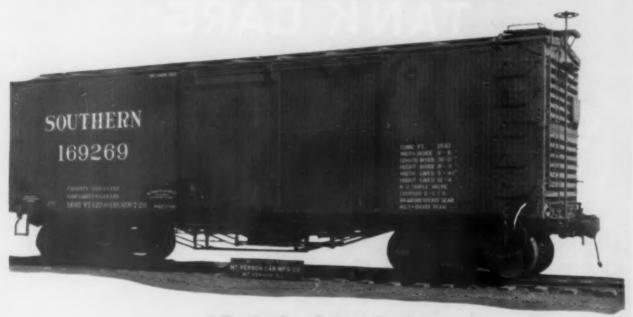
Tulsa I Kansas City Houston

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## MT. VERNON CAR MFG. CO.

MT. VERNON, III.

Builders of All Kinds of Freight Cars



40-Ton Southern Railway Box Car.



70-Ton All Steel Hopper Cars

Individual shop and special facilities for Rebuilding and Repairing cars.

ANNUAL CAPACITY:

15,000 Freight Cars 150,000 Cast Iron Car Wheels 20,000 Tons Forgings



#### CAR SEAT PLUSH OF ALL KINDS

YOU WILL FIND MASSACHUSETTS PLUSH USED ON LEADING RAILROADS FROM COAST TO COAST, FROM CANADA TO THE GULF, IN NEW AND OLD EQUIPMENT, AND IN ALL CLASSES OF CARS WHERE PLUSH IS USED. OUR 35 YEARS' EXPERIENCE IN MANUFACTURING CAR PLUSH ENABLES US TO SUPPLY A FABRIC UNSURPASSED IN BOTH APPEARANCE AND DURABILITY.

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Western Agent
MIDGLEY & BORROWDALE
1822 McCormick Bldg.
Chicago, Illinois

# Traffic Conditions Have Changed

in 1860 there were 30,620 miles of railroad in the U.S.



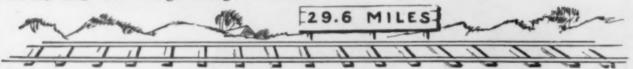
in 1926 there were 258,000 miles.



in 1920 the average daily car mileage for freight cars (including "empties") was 25.1.



in 1926 the average mileage was 29.6.



in 1920 45,118,472 carloads of revenue freight were handled by railroads of the U.S.



in 1926 (December estimated) 57,000,000 carloads were handled.



All of these conditions demonstrate one outstanding fact: traffic conditions have changed. Strenuous conditions call for durable equipment. • • • • The new Gary Light Weight Wrought Steel Wheel (especially adapted to freight car service) is an answer to that call.

Our wheel specialists are at your command.

### Illinois Steel Company

General Offices: 208 South La Salle Street . . Chicago, Illinois



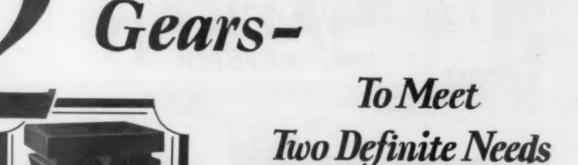
In adopting this approved accident-proof safety car step, you will be buying dependable liability insurance at extremely low cost.

Slip-proof, miss-proof, self-cleaning, it minimizes "aisle" accidents as well as "step" and "platform" accidents.

Damages paid for one such accident may cost you more than a "Safkar" Step equipment for every car on your system.

Let us send Bulletin D-33

IRVING IRON WORKS GO.
LONG ISLAND CITY, N.Y. U.S.A.
Established 1902



#### Waugh Gould Friction Gear

For Freight Train Service—high capacity and high shock absorbing ability are required to provide protection to car and lading in shifting cars in classification yards and elsewhere. These two qualities are combined with unusual sturdiness and reliability in the Waugh-Gould Friction Gear.

#### Waugh Plate Spring Friction Gear

For Passenger Train Service—a smooth, soft initial cushion and quick release to be instantly responsive, are outstanding features of the Waugh Plate Spring Friction Gear. In addition it has ample capacity and absorption for the severest service conditions passenger train cars must meet.

Descriptions of these gears and records of tests and service are worthy of your consideration. May we send them to you?

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# RAILWAY CAR EQUIPMENT





# Passenger Cars, Freight Cars,



Other Bethlehem Products for Railroads:

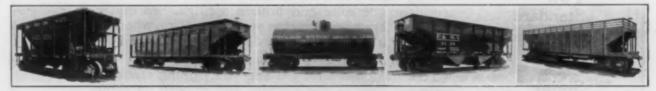
The Bethlehem Auxiliary Locomotive 4- and 6-wheel types

Boiler Tubes
Car Tracks
Car Underframes
Froga and Switches
Rails and Accessories
Special Layouts and
Trackwork
Staybolt and Staybolt
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(SINCE 1836 the Harlan Plant of Bethlehem Steel Company at Wilmington, Delaware, has built thousands of cars of every type for use on American Railways, including passenger, mail, baggage, express, dining, private, combination and special purpose cars.

(FOR more than twenty years the Cambria Plant of Bethlehem Steel Company at Johnstown, Pa., has been building steel freight cars of every type, including gondola, hopper, ballast, flat, coke, box and tank cars.

MODERN shop facilities and a thoroughly trained personnel
 make possible the production of the highest grade cars and car
 equipment.



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District Offices: Boston New York Buffalo Philadelphia Pittsburgh Baltimore Washington Atlanta Cleveland Cincinnati Chicago Detroit St. Louis Seattle Portland San Francisco Los Angeles

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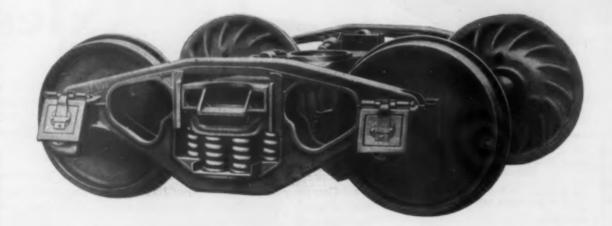


# Solve the Spring Question

by Using

**Bettendorf Trucks** 

[ Dalman · Type ]



The
Dalman
Feature
Adds
Two
Standard
Coils
To
Each
Spring
Group

SINCE early in 1922, a large number of the famous Bettendorf Trucks PLUS the Dalman feature have gone into service. These trucks have been kept under constant observation and have measured up to every promise of dependability which the soundness of their design indicated.

That these trucks successfully combat the startling prevalence of solid and broken springs, lies in the fact that they offer a reserve spring capacity, whereas, trucks with A. R. A. standard spring groups are 21% deficient.

Your customer's freight and your rolling stock investment deserve the security and smooth handling afforded by the Bettendorf-Dalman Truck.

THE BETTENLOR BETTENDORF, IOWA

## INVESTMENT SUGGESTIONS

Railroad Bonds To yield 4.65% to 5.40%

Municipal Bonds To yield 4.75% to 5.40%

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Industrial Bonds To yield 4.60% to 6.80%

Foreign Government and Foreign Municipal Bonds To yield 4.70% to 7.60%

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Preferred Stocks To yield 4.80% to 8.25%

# Spencer Trask & Co.

Investment Securities

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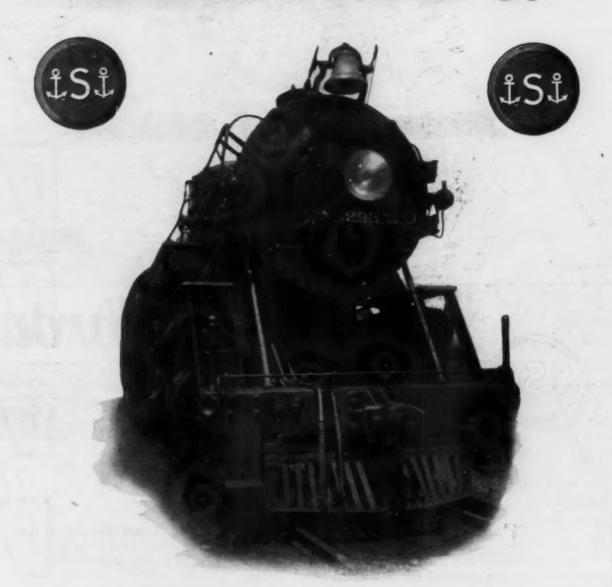
CHICAGO

**PHILADELPHIA** 

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# "Standard"



# For Those Vital Parts

## STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

CHICAGO

NEW YORK

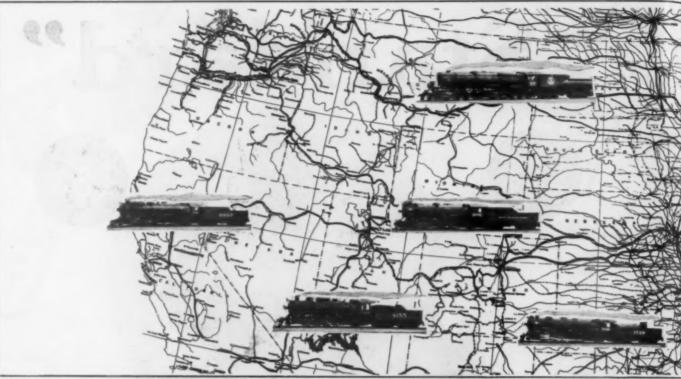
BRANCH OFFICES

PORTLAND

SAN FRANCISCO

WORKS: BURNHAM, PA.

PITTSBURGH MEXICO CITY







THAT "Standard" quality meets the exacting requirements of present day service conditions is proved by the fact that although strains and stresses are rapidly increasing, there is a constant growth in the demand for Standard Steel Parts.

During the year of 1926 "Standard" Steel Parts were specified for hundreds of locomotives built for various railroads throughout the nation.

These locomotives represent practically every known type now in use including some of the finest three cylinder units and heaviest articulated power ever designed.

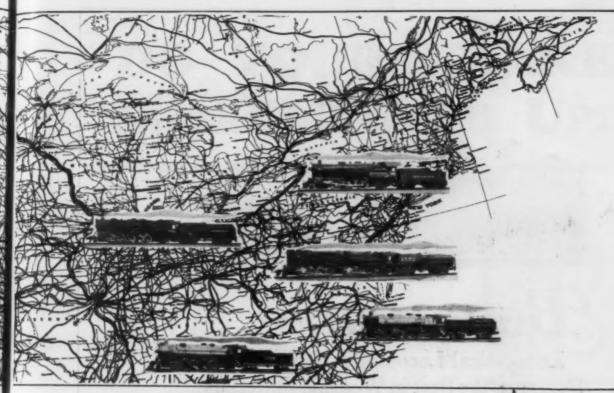
# STANDARD STEEL Philadelphia,

CHICAGO .

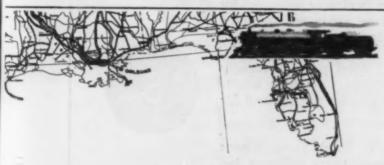
ST. LOUIS -

NEW YORK -

HOUSTON - PORTLAND



out the Nation ...





NOWADAYS railroads are selecting their wearing materials on a mileage basis—that's why so many have standardized on "Standard" Steel Parts.

"Standard" Steel Parts are especially designed for the particular class of service for which they are intended—steel parts that have always been noted for their superior wearing qualities.

Whether it's for new power or replacements, make sure your road is taking advantage of the economical service built into Standard Steel parts.

WORKS COMPANY

RICHMOND - SAN FRANCISCO - ST. PAUL - PITTSBURGH - MEXICO CITY



# Because -

Economical Locomotive Operation
Demands the Best in Wearing Materials

THAT "Standard performance" is a large contributing factor to the economical performance of a locomotive, is clearly indicated by the fact that Standard Steel parts are standard on the majority of leading railroads.



Specification of Standard Steel parts is rapidly becoming a popular practice—The more exacting the requirements, the greater the demand for "Standard Service."

Specification of Standard Steel parts means better engine performance, more mileage between renewals and lower repair costs.

It pays to Standardize on "Standard Steel Parts"

## STANDARD STEEL WORKS COMPANY PHILADELPHIA, PA.

BRANCH OFFICES:

Chicago New York Portland, Ore. San Francisco Pittsburgh, Pa. St. Louis Houston, Texas Richmond, Va. St. Paul, Minn. Mexico City, Mex

Works: Burnham, Pa.

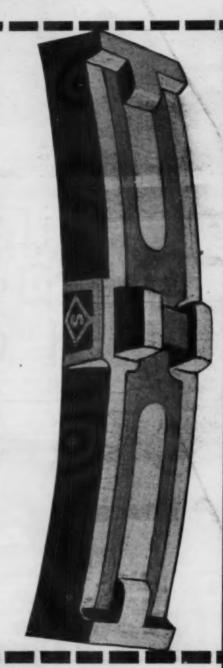


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# DO YOUR BRAKE SHOES MEASURE UP?

T is natural, at this time of year, to review the cost of items used in operation and to measure up the value of the service they have rendered. A brake shoe, for example, should be measured not by dollars, not by pounds, not by inches, not by work but by a combination of these factors-its cost per foot pound of work delivered. Measure the useful work accomplished between first application and final removal and you establish its true value. Every type of American Brake Shoe is measured in this way, on our brake shoe testing machine. It is measured again in actual use. It must show that it can stop a train safely at a lower cost per unit of work than other shoes in similar service. It must demonstrate that it is truly-

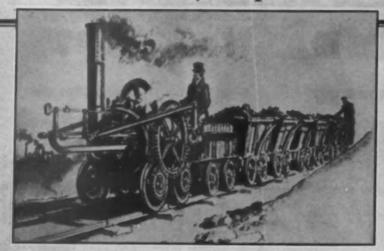
"BEST BY TEST"



THE AMERICAN BRAKE SHOE AND FOUNDRY COMPANY

30 CHURCH ST., NEW YORK 332 SO. MICH. AVE., CHICAGO

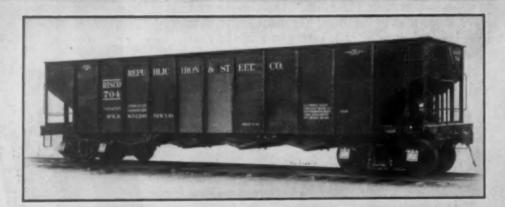
## 50 Plants-Daily Capacities 20,000 Wheels



An English coal train of 1803

# Give us the service and we'll give you the Chilled Car Wheel

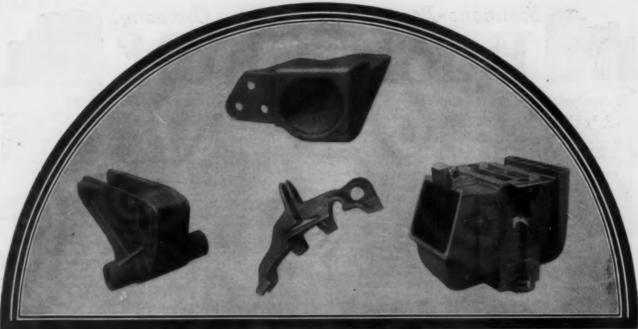




A. R. A. Standards

650 lb. Wheel for 30 Ton Cars 750 lb. Wheel for 50 Ton Cars 700 lb. Wheel for 40 Ton Cars 850 lb. Wheel for 70 Ton Cars

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS 1847 McCORMICK BUILDING, CHICAGO



Bell crank for operating dump car.

Push pole pocket for freight car.
Brake head.

Railway journal box.

A few of the many vital railway parts made of Certified Malleable,

#### Certificate Holders During Quarter Ending December 31, 1926

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You can obtain, in Certified Malleable Iron, a combination of valuable properties found in no other material. This product offers you:

Great Strength with Light Weight—Reductions of 50% to 60% in the weight of vital machine parts are possible by replacing other iron castings with Certified Malleable. Freight and handling charges are cut down and a strong, tough part substituted for a brittle one.

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Uniform Structure—The indisputable evidence of the camera and the microscope prove that Certified Malleable is uniform from skin to core. The valuable physical properties of Certified Malleable go clear to the heart of every piece.

A Well Known Name—"Certified Malleable" is a product of definitely known, and established physical properties. Its generous use puts your product in the Certified class and makes it readily accepted by buyers.

Certified Malleable, regularly exceeding the standard minimum specification of 50,000 lbs. tensile strength and 30,000 lbs. yield point, is described in a new and authoritative book. Copy sent you free on request.

AMERICAN MALLEABLE CASTINGS ASSOCIATION UNION TRUST BUILDING CLEVELAND, OHIO





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J. L. White, formerly assistant comptroller, U.S.R.R. Administra-tion. A book the railway world has long been awaiting. It explains clearly the use of the elaborate railway accounts and shows how accounting figures can be shown to reflect accurately the efficient or inefficient operations of a road as a whole or of any department. It is invaluable to all statisticians and analysts in the transportation, maintenance and mechanical departments, and also to accounting de-partment employees. 381 pages, illustrated, 6 x 9 inches. Price \$3.50.

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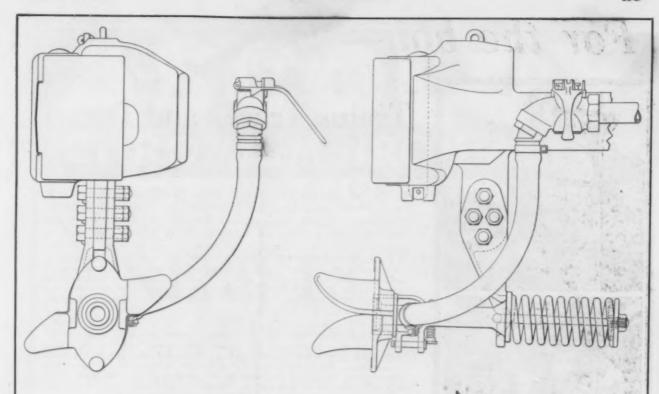
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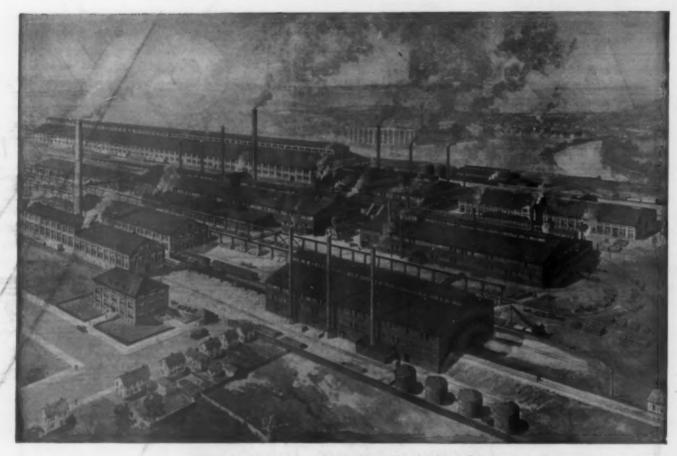
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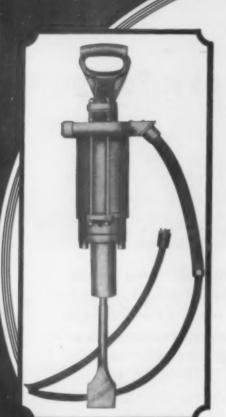
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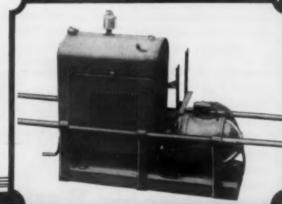
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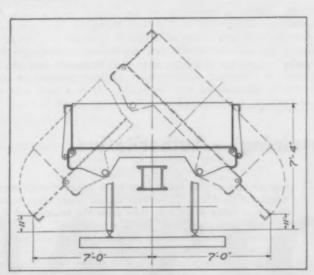
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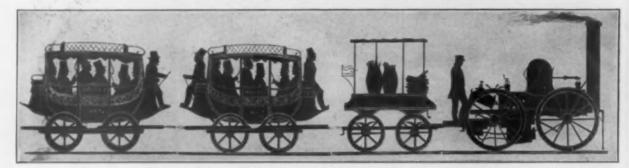
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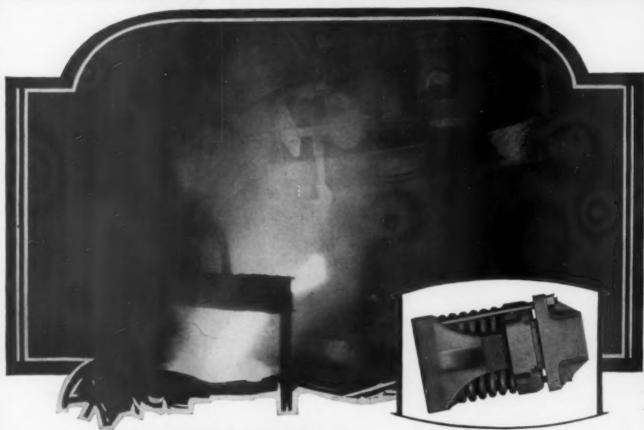
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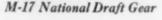
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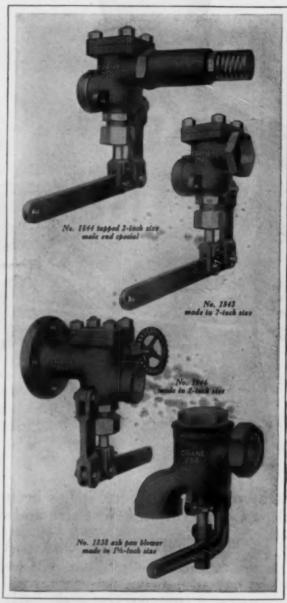
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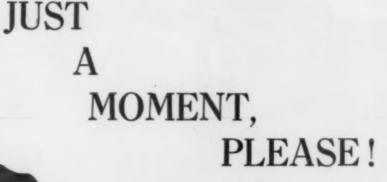
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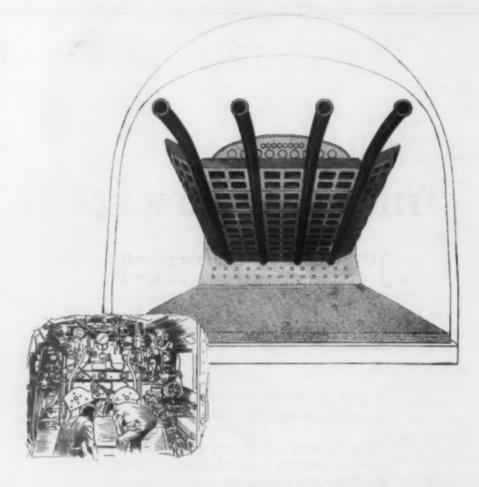
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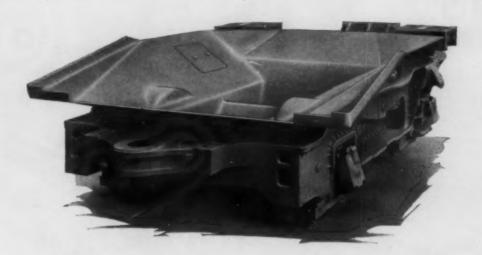
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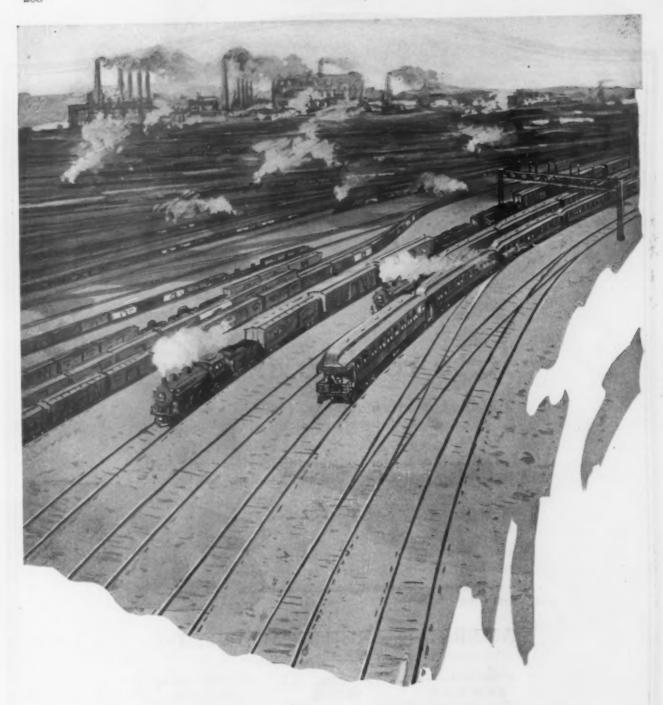
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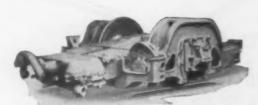
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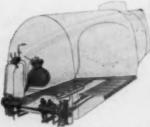
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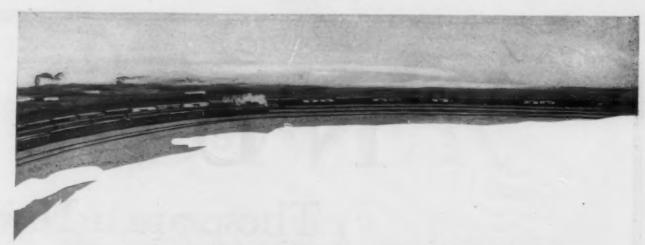


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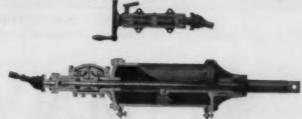
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MOTIVES

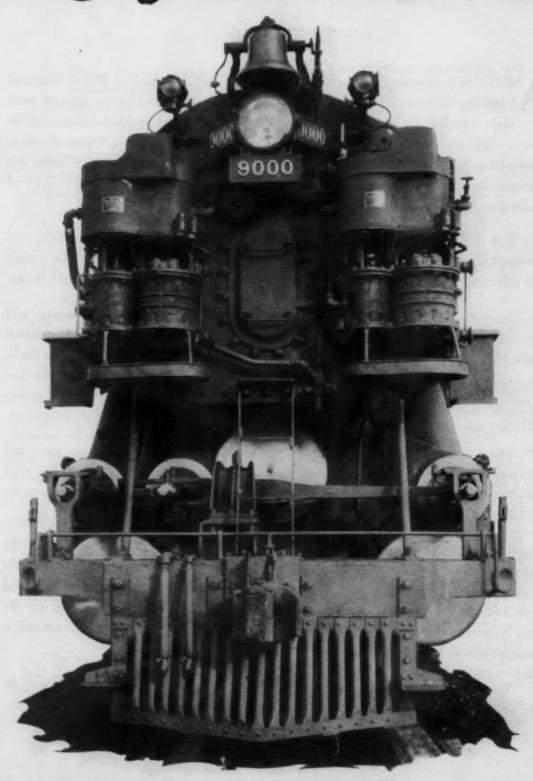




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MERICAN railway systems have reached a high standard in the economical handling of transportation, but many of them are taxed to the utmost with their existing facilities. Therefore, it is the purpose of this discussion to show how a relatively small change in the construction of the prevailing types of steam locomotives will produce a relatively great increase in hauling capacity from the transportation standpoint, comparable with those brought about in the field of modern stationary power practice.

It is generally agreed that the reciprocating engine is the most practical and economical application of steam power to a locomotive, on account of the simple and effective means it affords of transmitting power throughout the speed range.

Accepting this, the question to decide is what form or type of engine will deliver the maximum combined power, speed, and economy at a minimum initial cost and with the least expenditure for maintenance, not only to the machine itself, but of the roadway over which it runs. In other words, what can be done further to reduce ton mile cost of transportation from the standpoint of the motive power unit?

The two-cylinder engine has been the mainstay up to the present time but many who are vitally interested in this question are confirmed in the belief that the three-cylinder locomotive best answers this question as applied to the immediate future.

Both power and speed are increased in the three-cylinder locomotive as compared with the prevailing two-cylinder type, both these factors having an important bearing on economy of operation. Trains can be taken over the road with less stand-by losses, overtime, and fuel consumption. The capacity of the road is increased and a powerful influence in obtaining business on a railroad is made available where prompt delivery of freight is essential.

The advantages of the three-cylinder locomotive over the two-cylinder may be summarized as follows:

MERICAN LOCOMOTIVE COMP

30 CHURCH STREET,

- 1—Greater starting power, as well as greater tractive power, drawbar hp. and sustained hp. at speed.
- 2—Less dynamic effect on the rail, therefore, less destructive to itself and to the right-of-way generally.
- 3-Greater average speed, and, therefore, less stand-by loss.
- 4-Increased fuel economy and boiler efficiency.
- 5-Greater mileage between general repairs.
- 6-Greater mileage between tire turnings.
- 7-Greater power per unit of weight.
- 8-Lends itself to the use of an added pair of coupled drivers.
- 9-Lower factor of adhesion without increased slipping tendency.
- 10-More even distribution of power over the frame structure, resulting in fewer failed parts, such as broken axles and frames.
- 11-Larger exhaust tip with less back pressure.
- 12-Fewer locomotives and trains required to handle a given traffic.
- 13-A more powerful locomotive within less clearance limitations.

The greatest economy undoubtedly results from the fact that fewer locomotives and trains are required to handle a given traffic, this having a most important bearing on maintenance. One railroad official concludes from a careful estimate that the elimination of one train per day out of a total of 58, by using more powerful and speedier locomotives of the three-cylinder type, each hauling more cars, would save his road about \$70,000 annually, not counting the lessened wear and tear to the right-of-way. It is very significant what the saving would be if locomotives were used developing tractive power sufficient to eliminate several trains, consolidating their tonnage into a lesser total number, with speed sufficient to keep out of the way of other trains and off the sidings as much as possible. This phase of the question is worthy of the most serious consideration.

The number of three-cylinder locomotives built and building by the American Locomotive Company to date is 155, most of which are in service and exemplifying their superiority from a practical operating standpoint.

AMERICAN LOCOMOTIVE COMPANY

30 CHURCH STREET,

NEW YORK CITY



Union Pacific



Union Pacifi



Delaware, Lackawanna & Western



Louisville & Nashville



E. F. Sorocabane



Misseuri Pacific



New York, New Haven and Hartford



Alton and Southern



Chicago, Rock Island & Pacific



Lehigh Valle



South Manchuria



Delaware, Lackawanna & Westerr



Louisville & Nashville



Southern Pacific



Missouri Pacific



New York, New Haven & Hartford



Wahash



New York Central



Imperial Government Railways of Japan

AMERICAN LOCOMOTIVE COMPANY

30 CHURCH STREET,

NEW YORK CITY

# BALDWIN Locomotive No. 60,000



OUR most significant achievement during the year 1926, was the development of a three-cylinder compound locomotive of the 4-10-2 type, having a water tube firebox and carrying the unusual steam pressure of 350 pounds.

As a result of most thorough tests both on the stationary plant and the road, this locomotive has demonstrated its ability to develop high horse power with a maximum degree of economy.

Some of the important features of Baldwin Locomotive No. 60,000, which make this design a distinct advance in the development of power for heavy freight service, are shown on the following pages.

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

#### BALDWIN

### Locomotive No. 60,000

General Data



Cylinders:

High-pressure (1) 27"x32"

Low-pressure (2) 27"x32" Orivers, diam. 631/4"

Drivers, diam. Steam pressure

350 lb. Tractive force Grate area

Water heating surface

Superheating surface Weight on drivers

Weight, total engine

1357 sq. ft. 338,400 lb.

82.5 sq. ft.

5192 sq. ft.

ght, total engine 457,500 lb. 82,500 lb.

THE general design of Baldwin Locomotive No. 60,000 is shown in this illustration. The piston of the inside (high-pressure) cylinder is connected to the second pair of driving wheels, which has a crank axle; while the pistons of the two outside (low-pressure) cylinders are connected to the third pair. The two outside cranks are placed 90 degrees apart, so that there are four even exhausts per revolution; and the inside crank is placed 135 degrees from each outside crank.

No. 60,000 has flanged tires on all the wheels, and is designed to traverse curves of 17 degrees. The front truck has a swing bolster suspended on heart shaped links. There is a continuous equalization system on each side of the locomotive, from the leading drivers to the rear truck.

#### BALDWIN

### Locomotive No. 60,000

The Boiler

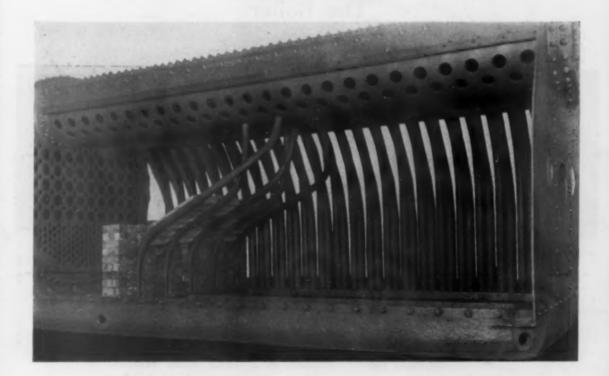


THE boiler, as illustrated, is composed of a smokebox, cylindrical barrel section, and water tube firebox. The firebox extends forward over the rear pair of driving wheels. The barrel section is composed of three courses, and is closed by front and back tube-sheets, the length of the tubes being 23 feet. The shell plates in the first, second and third courses are respectively 1-5/16, 13/8 and 11/2 inches thick. The third course is sloped on top, increasing the shell diameter from 84 inches at the front end to 94 inches at the back. The longitudinal seams are of the so-called "saw-tooth" octuple riveted design, which provides a short caulking distance between the rivets.

None of the studs tapped into the boiler passes all the way through the sheets, hence there can be no leaky studs or stays.

# BALDWIN Locomotive No. 60,000

The Firebox



THE firebox of Baldwin Locomotive No. 60,000 consists of a cast steel mud-ring at the bottom, two horizontal drums at the top, and groups of tubes, 4 inches in diameter, which connect the mud-ring with the drums. There are 48 such tubes on each side and four at the back. Connection between the bottom of the boiler barrel and the front end of the mud-ring is made by two elbow pipes, each nine inches in diameter, and placed right and left. The mud-ring has a central longitudinal member, which is cored to permit water circulation; and also, about six feet from its forward end, a hollow transverse member located at the front of the grate. From this transverse member, five water tubes extend to the upper drums, and serve as supports for the brick arch.

The firebox is walled in with firebrick, and is lagged and jacketed. One of the most notable features in its construction is that the use of stay-bolts is entirely eliminated.

# BALDWIN Locomotive No. 60,000

The Cylinders



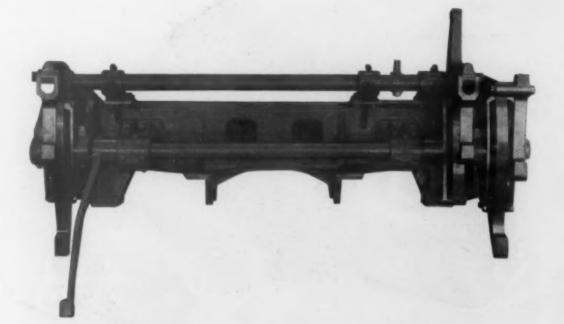
THE three cylinders of Baldwin Locomotive No. 60,000 with their steam passages and steam chests, are formed in a single grey iron casting. The high-pressure steam chest is placed in the saddle, on the right hand side, and is connected with the superheater header by a single steam pipe. All the piston valves are 14 inches in diameter. That for the high-pressure cylinder is arranged for inside admission, while the valves for the low-pressure (outside) cylinders are arranged for outside admission. The high-pressure exhaust is conveyed to the low-pressure steam chests through passages cored in the cylinder casting, while the exhaust from the low-pressure cylinders passes to the smokebox through outside pipes.

Under all ordinary conditions of operation, this locomotive works compound. When starting, live steam can be admitted to the low-pressure cylinders through a  $1\frac{1}{2}$ -inch pipe leading from a manually controlled valve in the cab.

# BALDWIN ——— Locomotive No. 60,000

comotive 1 to. 00,0

The Valve Gear



DUE to the arrangement of the cranks on Baldwin Locomotive No. 60,000, an interesting problem was presented when designing the valve gear. The two outside cranks are placed 90 degrees apart, and the inside crank is placed at 135 degrees from each outside crank.

The valve gear is of the Walschaerts type, with an independent motion for each cylinder. The valve for the left-hand cylinder is operated from the left-hand main pin and crosshead in the usual way. The right-hand valve receives its lead from the right-hand crosshead, but the link for this cylinder is operated, through a transverse shaft, by means of a connection to the left-hand crosshead. The return crank on the right-hand main pin is set to operate the valve for the inside cylinder, and this valve is given lead through a connection with the inside crosshead.

The illustration shows the valve motion bearer, with the assembled links and reverse shaft.

#### **BALDWIN**

### Locomotive No. 60,000

The Newest Power Achievement



THE railways are today in urgent need of locomotives that will produce an increased ton mileage per hour. This requirement involves not only high tractive force, but also speed capacity for sustained periods.

We offer locomotives of this design in full confidence that they will meet the most exacting demands of heavy traffic. Locomotive No. 60,000 is especially fitted for freight service, but the same principles of construction can be used in motive power for passenger service.

There are many locomotives in use today that could profitably be replaced with strictly modern power. We are ready at all times to cooperate with any railway desirous of raising the standard of its motive power equipment.

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

USE Barco Roll

Longer runs, heavier trains and faster schedules, make it essential to economy and efficient performance, that the correct cut-off be maintained at all points of the quadrant.

Barco power reverse gears insure the correct cut-off being maintained, for pressure plays no part in holding piston position. Therefore, the gear cannot creep.

Use Barco Gears on your power and reduce your running costs.

STARTING jerks, curve swings and running sways all subject engine and tender connections to abuse and breakage, making frequent renewals necessary, unless they are especially adapted to withstand the strain.

Barco 3 V engine and tender connections materially lower pressure losses, insure freedom from leaks and combine strength and flexibility that prevent breakage.

Use Barco connections and be sure of dependable service at low upkeep costs.

Let us assist you in obtaining Send for catalogues

quently lead to terminal delays and engine failures.

Barco flexible joints absorb these vibrations, prevent pipe breakage and eliminate the leaks that add to maintenance

N your modern power there

is approximately 1,000 feet of piping that is subject to

leaks and breaks due to vibrations. Conditions which fre-

Use Barco joints on your piping and promote efficient service with economy.

### Barco Manufact 1 1801 Winnemac

In Canada Montreal-Toronto

THE HOLD E



ON your cars and rear of tenders Barco 1½" or 2" connections provide full area free passages in all positions, being built for full boiler pressure. They have the fewest parts, are easily and economically maintained.

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In your stations and coach yards Barco connections by their quick adjustment to any angle speed up car couplings and reduce the amount of labor required for this work.

BARCO lubricated plug valves may be lubricated under full pressures and high temperatures by a simple twist of the thumb. This feature insures long and dependable service free from valve troubles.

In addition to shop use they are especially adaptable to injector feed pipe lines on your tenders.

Use Barco valves and eliminate frequent valve renewals and upkeep.

THE extending of division runs have lessened the number of locomotives in service so that after a boiler wash, engines must be dispatched quickly.

Barco flexible blower lines and smoke box blower fittings speed up the dispatching of engines by their quick adjustment and positive action. By eliminating leaks, they also lower fuel consumption.

Use Barco equipment in your roundhouses and be assured of low upkeep costs.

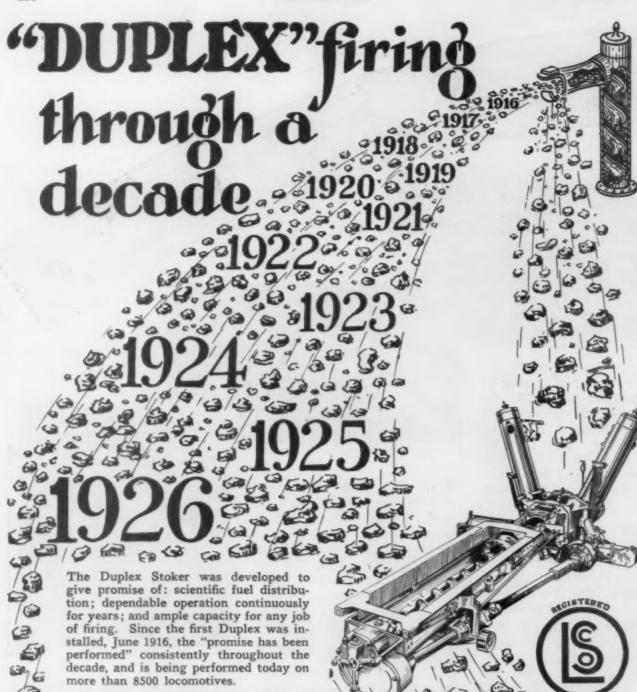
increased service from your equipment of Barco Specialties.

### et uring Company

Ave., Chicago, Ill.

D EN CO., LTD.

In Canada Winnipeg-Vancouver

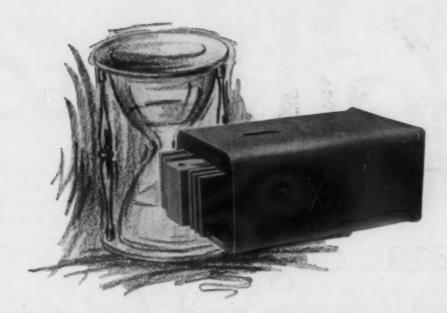


#### LOCOMOTIVE STOKER CO.

Manufacturers of Duplex Stokers, Elvin Shovel Type Stokers, Mechanical Coal Pushers

Main Office and Works—30 General Robinson Street, West Northside, PITTSBURGH, PA.

Westinghouse Bldg. 150 Broadway NEW YORK Munsey Bldg. 1329 "E" St., N. W. WASHINGTON Railway Exchange Bldg. 80 E. Jackson Blvd. CHICAGO



#### As consistent as the years

MOST equipment in the railroad field is new but once. Its span of usefulness is based on years of service, which makes the coming of a new year just the passing of another mile stone in its life of efficiency. All Westinghouse Type "N" friction draft gears are built to stand the rigors of heavy service, dissipate shock, and give a quick positive release. Even more, their original service life, although prolonged through their scientific makeup, is by far not their scope. Just as we add a figure to the years, starting over into a fresh period of life, so does a simple liner or shim inserted\* in type "N" draft gears rejuvenate-start them on a fresh period of life, into another span of faithful service. This feature, characteristic of all Westinghouse Type "N" draft gears, makes them by far the most outstanding draft gear of today-and consistently so.

\*This operation, distinctive with Westinghouse type "N" gears may be repeated indefinitely.

#### WESTINGHOUSE FRICTION DRAFT GEAR CO. PITTSBURGH, PA.

General Sales Office: 913 Peoples Gas Bldg. CHICAGO, ILL.

8006

The first friction draft gear was a Westinghouse



# the same engine crew handles heavier and faster trains

A train of 16 loaded ore cars used to be the maximum which one locomotive and a single engine crew could handle on the Smelter Hill lines of the B. A. & P. The up-grade run was made in 45 minutes with 6 round trips and a total delivery of 96 cars in every locomotive shift.

Now 25 loaded cars are hauled by a two-unit electric locomotive. The up-grade run is made in 26 minutes, with 8 round trips and a delivery of 200 cars per shift—an increase of 108% in the number of cars handled by the same engine crew in the same period of time.

One of a series depicting actual operating experience on well-known electrified rail-roads.

Actual operation is proving the economy of electrification.

### AMERICAN LOCOMOTIVE GENERAL ELECTRIC

# Saves

\$ 13.82 in fuel 9.19 in wages

23.01 every day

This Oil-Electric Locomotive has replaced two of four steam locomotives in the North Pier area of the Chicago & North Western. Another, recently delivered, will replace the remaining two. Mr. George Hand, Assistant to President of the C. & N. W. Ry., says:

"We are operating the oil-electric 24 hours a day, changing crews every eight hours."

"The wage cost of the oil-electric is \$36.23 a day, while the same service with steam locomotives cost \$45.42."

"For fuel oil the average has been \$6.62 a day with an average of three cents a day for gasoline. That is a total of \$6.65 a day as compared with \$20.47 a day for a steam locomotive."

"Projecting the figures over a year including roundhouse expense and lubrication, we now estimate the oil-electric operation will cost \$13,200 and the steam locomotive \$24,696."

These figures represent one month of operation and approximate the average results obtainable under similar conditions.



The Oil-Electric Locomotive

#### Are you interested in:

Saving 12 per cent of total fuel consumed by your locomotives per year—and 14 per cent of total water used?

Increasing locomotive boiler capacity by 10 per cent to 13 per cent—and drawbar pull at speed?

Reducing stops for water and coal?

Removing 80 per cent of corrosive oxygen from feedwater?

Lessening amount of scale?

Purifying your water?

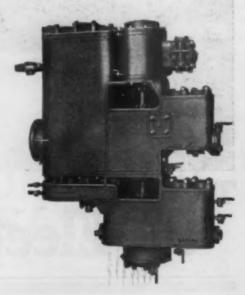
Extending the life of your old locomotives by increasing steaming capacity and reducing fuel consumption?

If so—The Worthington Locomotive Feedwater Heater gives you all of these advantages. Besides, it pays for itself in from one to two years. A recent booklet describes this equipment. The coupon below is for your convenience.

#### WORTHINGTON

Feedwater Heaters Compressors Oil and Gas Engines
Pumps Condensers Oil and Water Meters

115 BROADWAY, NEW YORK	
Please send me further information on the W	orthington Locomotive Feedwater Heate
Name	
Position.	
Railroad	





#### Announcing—

#### The New Locomotive Cyclopedia 1927 Edition

To be released April, 1927



HE new Eighth Edition of this standard authority on motive power will be off the press in March. Its release will undoubtedly be followed by an unprecedented demand for copies of this completely revised and authoritative book.

Edited by Roy V. Wright, Managing Editor of the Railway Age, and Editor of the Railway Mechanical Engineer, and by R. C. Augur, Managing Editor, with contributing editors and under the auspices of an advisory committee of American Railway Association, Division V, Mechanical, its authoritativeness cannot be questioned.

One of the outstanding features of this new edition will be the complete new section on Locomotive Shops and Engine Terminals. Beginning with floor plans and layouts of modern railway shops and engine terminals, this section, chapter by chapter, discusses practically all of the types and sizes of machine tools and other shop equipment and indicates the work for which each tool is best adapted. The contributing editor of this section is one of the outstanding authorities on machine tools and their application to railway production.

All of the other sections have also been revised and brought up to date as of 1927 and includes the changes in the designs of locomotives that have taken place in the last few years, including, for example, the high-pressure locomotive, water tube boilers and other important recent developments.

The comprehensiveness of the Locomotive Cyclopedia can possibly best be gathered from a list of the section heads, which are as follows. Dictionary of Terms—Steam Locomotives, Domestic (United States and Canada)—Locomotive Boilers: Design and Details—Boilers: Water Supply—Boilers: Fuel and Combustion—Cabs, Fittings, Boiler Mountings—Cylinders and Driving Gear—Frames and Running Gear—Trucks; Locomotive and Tender—Locomotive Tenders—Couplers and Draft Gears—Brakes and Brake Gear (Includes Train Control)—Electric Locomotives—Internal Combustion Locomotives and Cars—Shops and Engine Terminals (Design and Equipment)—Inspection, Tests, Safety Appliances—Locomotive Materials—Industrial Locomotives—Foreign Locomotives.

There will be more than 1,200 pages. The size will be 9x12, there will be about 3,000 illustrations and the price will be \$5.00 for the cloth binding and \$7.00 for the leather binding. THIS WILL BE A STANDARD PRICE FOR THIS ENTIRE EDITION. THERE WILL BE NO PRE-PUBLICATION OFFER AND THERE WILL BE NO REDUCTION IN THE SINGLE COPY PRICE.

So that you will be assured of an early delivery of this excellent and helpful book, we urge you to reserve your copy now. Upon publication you may examine the book without any obligation to purchase.

#### Simmons - Boardman Publishing Company

30 Church Street New York City



34 Victoria Street London, S. W. 1

# **DUPONT-SIMPLEX**

50% of all stokers ordered for new power during 1926 were DUPONT-SIMPLEX TYPE "B" STOKERS. In addition over 300 DUPONT-SIMPLEX TYPE "B" STOKERS were ordered for home application to existing power.

A few important trains fired by DUPONT-SIMPLEX STOKERS

ILLINOIS CENTRAL R. R.

Train No. 3—New Orleans Limited. Train No. 7—Panama Limited. Train No. 9—The Seminole.

NORTHERN PACIFIC RAILWAY

Trains Nos. 1 and 2—North Coast Limited. Train No. 3—Pacific Express. Train No. 4—Atlantic Express.

SOUTHERN RAILWAY

Crescent Limited.

SOUTHERN PACIFIC R. R.

Trains Nos. 1 and 2—The Californian. Trains Nos. 3 and 4—Golden State Limited.

GREAT NORTHERN R. R.

Train No. 1-The Oriental Limited.

DENVER & RIO GRANDE WESTERN R. R.

Train No. 1—Scenic Limited.
Train No. 3—Salt Lake-San Francisco Express.
Train No. 4—Denver & Eastern Express.

ST. LOUIS-SAN FRANCISCO RAILWAY

Train No. 107—The Sunnyland. Trains Nos. 105 and 106—Kansas City-Florida Special.

WESTERN PACIFIC

Fast Fruit Express-Mikado No. 301.

VIRGINIAN

Heavy Mallet No. 806.

(The most powerful steam locomotive in the world.)

This is but a partial list of important runs fired by DUPONT-SIMPLEX TYPE "B" STOKERS. Additional lists will be shown in following advertisements.

#### STANDARD STOKER

350 Madison Avenue,

Foundries and Works-

Eri

McCormick Building, Chicago

# TYPE "B" STOKER



#### **DUPONT-SIMPLEX TYPE "B" STOKER**

#### Is the Simplest Locomotive Stoker

- 1 It has fewer parts than any other stoker.
- 2 It is readily accessible for adjustment or replacement of parts.
- 3 There are no obstructions on the backhead.

The cab and firedoor are clear of stoker parts.

- 4 Actual service records have proved its reliability of performance in every class of service over hundreds of thousands of miles.
- 5 Its low maintenance cost will surprise you. Actual maintenance records are available on request.
- 6 A few important runs fired by DUPONT SIMPLEX TYPE "B" STOKERS are shown on the opposite page.

### COMPANY, Incorporated

New York, N. Y.

Erie, Pennsylvania

nue,

rks-

du Pont Building, Wilmington, Del.

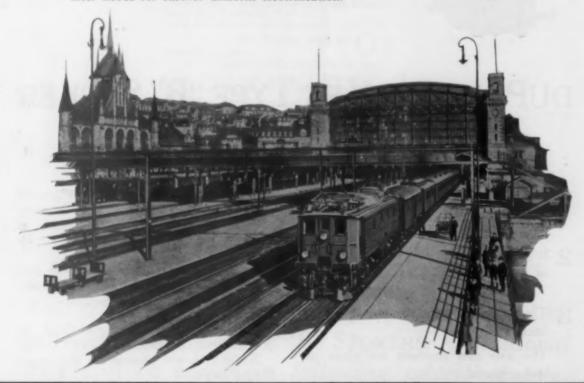
#### American BROWN BOVERI

#### Electrification of Terminals

The bugbear of city terminal operations is obviated constructively with the electrification of the section. Cleanliness is next to efficiency...and electric operation insures both. The progress which electrification makes possible, is the kind of progress which enables railroads to gain esteem in the eyes of both the general and the investing public.

Whether you are considering terminal or other divisional electrification, this organization brings to you a long and varied experience which insures the soundest application of the most practical economic methods.

We work with you to the end that all modern methods known to the science are applied to the system you choose, as proper for your present and possible later needs for further uniform electrification.





#### PRINCIPAL PRODUCTS

Electric Locemotives
for any system of current, high
or low tensions
Complete Equipment
for railway electrification
Steam Turbo-Generators
for normal or high pressures and
superheats
Transformers (power or current)

Switches, Centrollers and all Auxiliary Equipment Oil Switches Condensers and Auxiliaries Mercury-Arc Pewer Rectifiers (steel enclosed) Automatic Regulators Relays Turbe-Compressors and Blowers Induction Regulators

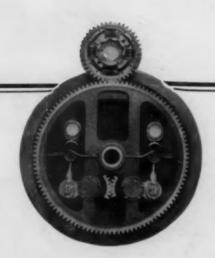
Electric Furnaces
Retary Convertors
Motor Generators
Diesel-Electric Locomotives
Mining Locomotives
Ships
Diesel Driven
Turbine Driven
Electrically Driven

### The A-B-B Individual Axle Drive

The great achievements of the new Brown Boveri Locomotive with Individual Axle Drive are economy in design, operation, upkeep and wear. Its great achievement is the elimination of the shortcomings which have often been so bothersome in the other types of drives.

(6) Smooth running of the locomotive is due to the high center of gravity.

American Brown Boveri Electric Corporation 165 Broadway, N. Y. Camden, N. J. 842 Summer St., Boston 922 Witherspoon Bldg., Philadelphia 230 So. Clark St., Chicago



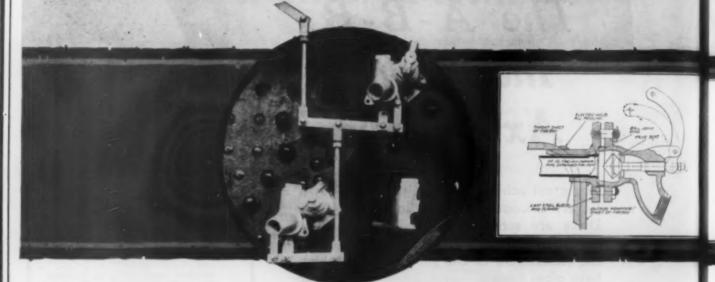
#### Characteristics of the A-B-B

#### Individual Axle Drive

- Absolute regularity in the transmission of the turning moment of the motor to the driving wheels.
- Relative vertical distance between the driving wheel and frame has no effect on axle load. Reduced tire wear-
- Wear on gearing reduced.
- 5. Bearings, commutator and brush gear made more accessible.
- Smooth running of the locomotive is due to the high center of gravity.
- Main driving parts submerged in oil
- High mechanical efficiency.
- Width of pinion and spur wheel not
- 10. Generous width of motor permitted.
- 11. No overhung pinion.
- 12. Low oil consumption.
- 13. Practically no attendance needed.
- Small track wear.
- 15. Radial adjustment of axle possible.

**AMERICAN BROWN BOYERI** 

# B.A. Co. SLUDGE REMOVER



This company is engaged primarily in the manufacture and supply of Boiler Chemicals for water treatment. Its activities in rendering the necessary expert service in this connection, are properly extended to cover the installation and service of B.-A. Co. Blow-Off Cocks, B.-A. Co. Washout Plugs. These items are all consistently designed to obtain one end: The promotion of Locomotive Boiler Efficiency.

#### **Better Engine Performance**

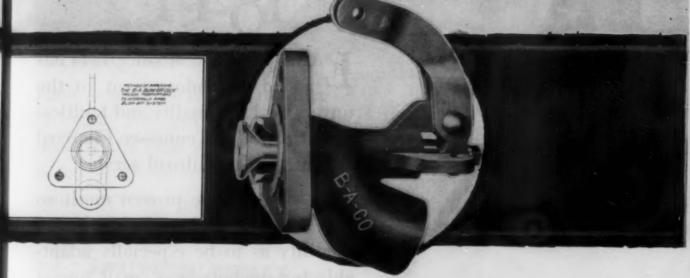
BOILER sludge must be removed. It causes scale formation, corrosion, boiler tube and firebox leaks. The blow-off cocks, as now used, clean out sludge only in parts immediately adjacent to them. This gives some relief, but the new Bird-Archer Sludge Remover multiplies this relief many times by extending the blow-off action through pipes run along the belly of the boiler and to the water legs of the firebox.

The Bird-Archer Sludge Remover consists of internally slotted copper pipes, drilled along the bottom of the entire length. These pipes are attached directly to two large blow-off cocks, both located at the same side of the firebox and connected to the same operating lever in the cab. When the blow-off cocks are open, the upper one draws sludge through the slotted copper pipe from the bottom of the boiler and the lower one draws sludge from the water legs.

# THE BIRD-ARC

PHILADELPHIA 2nd & Bristol Sts. Manufacturers and Suppliers of Boiler
CHICAGO 33 RECTOR ST.,
122 So. Michigan Ave.

# B.A. Co. BLOW OFF COCKS



#### **Less Fuel Consumption**

THE Bird-Archer Sludge Remover thoroughly removes boiler sludge. The multiplied effectiveness of this unique device has a very marked effect of locomotive performance increasing the efficiency and improving the performance of locomotives. This improvement is especially observed in better steaming of locomotives, less scale and great reduction in the tendency toward foaming. All of these have the effect of decreasing locomotive failures and maintenance expense; last but not least there is a very material reduction in fuel consumption.

One road which has standardized this equipment has found that boilers which formerly were held for washout after 200 to 500 miles, may now be operated up to 10,000 miles. The washout mileage in many cases being fixed by the monthly washout requirements of the law rather than by conditions of the boilers.

Write for descriptive booklet showing details of piping and mounting of apparatus.

Bird-Archer Blow-Off Cocks are made in four models, two screw and two flange. They can be ground under boiler pressure with a wrench. The Blow-Off Cocks are simple and rugged, with only three working parts. Bird-Archer Blow-Off Cocks are furnished for the Bird-Archer Sludge Remover and the slotted copper piping is furnished when desired.

# HER COMPANY

Chemicals for Water Treatment

**NEW YORK** 

ST. LOUIS Frisco Bldg.

MONTREAL McGill Bldg.

# Tenn. C. E.Bloom

# 1844

EACH passing year since 1844 has added its endorsement to the unvarying high quality and faultless performance of Tennessee Charcoal Bloom Iron in railroad service.

This iron of time proven merit so combines strength, toughness and ductility as to be especially adaptable for staybolts and small forged locomotive parts where stress, strain

In Use Sin

0

# 1927

and safety place greatest demands.

Each year an increasing number of railroads are specifying this iron because the most severe service imposed only serves to strengthen confidence in its greater efficiency and ultimate economies.

#### EWALD IRON COMPANY

NEW YORK ST. PAUL



Use Since 1844

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# Improved Forging and New Power

OCOMOTIVES of 1927 will be called upon for even greater performance than the present improved designs. Forgings must be equal to the greater demands.

The steel that will meet the locomotive forging requirements of 1927's new locomotives is Carbon-Vanadium.

Tough, strong and durable, forgings of Carbon-Vanadium are high in shock resistance and anti-fatigue properties.

With only a simple normalizing annealing, Carbon-Vanadium Forgings show well in excess of the minimum specified tensile strength of 90,000 lbs.; the minimum yield point of 60,000 lbs.; elongation in 2" of 20% and reduction of area of 40%.

In the design of new locomotives, Carbon-Vanadium permits of appreciable reductions in forging weight and dynamic augment, while assuring the requisite high forging strength and safety.

Write for standard specifications for Carbon-Vanadium Steel and data on savings in weight and reductions in dynamic augment through the use of Carbon-Vanadium Steel.

# VANADIUM

strength, toughness

### Casting Steels For In 1927

HIGH strength, with unusual resistance to shocks and dynamic stresses, will be required in frames and other castings of 1927's new power.

High-Test Vanadium Cast Steel meets all these requirements. Its tensile strength and yield point are greater by 15,000 lbs. or more per square inch than ordinary cast steel. The physical properties of High-Test Vanadium Cast Steel equal those called for in the specifications for quenched and tempered carbon steel forgings.

High-Test Vanadium Cast Steel also possesses much greater wear-resisting qualities than ordinary cast steel.

Send for standard specifications and data on recent locomotive applications of High-Test Vanadium Cast Steel.

### VANADIUM CORPORATION OF AMERICA

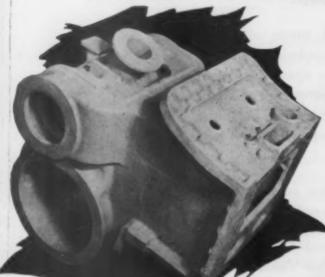
NEW YORK 120 Broadway DETROIT Book Bldg.

# STEELS for and durability



#### CAST STEEL LOCOMOTIVE FRAMES

OVER 20 years' experience in the manufacture of locomotive frames, specializing in the production of HIGH-TEST VANADIUM Steel Frames.



### CAST STEEL CYLINDERS

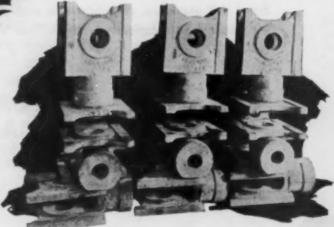
PIONEER manufacturers of Cast Steel Cylinders, now adopted by many prominent railroads and being applied on a large number of locomotives now in construction.

#### VANADIUM STEEL CROSSHEADS

RECENTLY adopted as standard equipment on several large roads.

We also make miscellaneous locomotive steel castings.

"Specify UNION"



#### UNION STEEL CASTING CO.

62nd and Butler Sts.

Pittsburgh, Pa.



Over A Quarter Of A Century
Of Leadership



Agathon Staybolt Steel







Three views from unretouched photographs showing how the fibrous structure of iron has been closely duplicated in Agathon Staybolt Steel.

#### Twice the Tortional Resistance Twice the Impact Value of Iron

Agathon Staybolt Steel is soft and ductile, threads and heads over as readily as wrought iron, is free from slag pockets and inclusions and has physical properties superior to wrought iron in every respect, as evidenced by the following table of tests made by a large Eastern System.

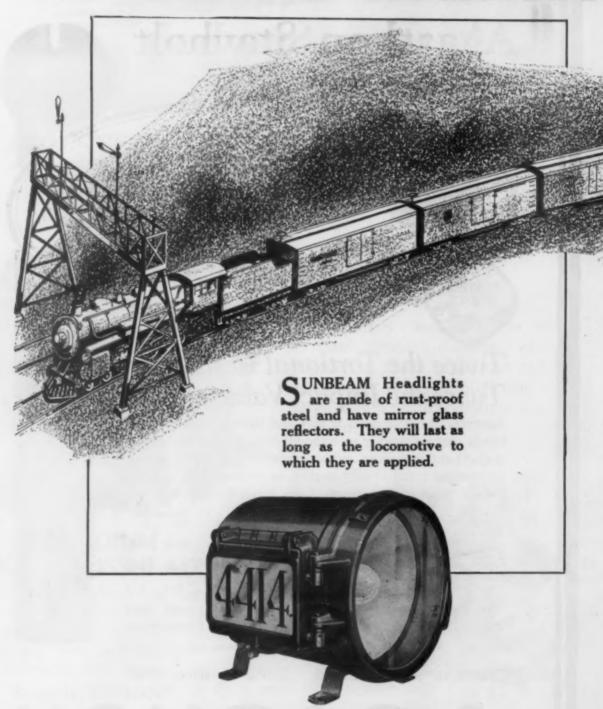
	Agathon Staybolt Steel					Wrou	Wrought Iron	
Serial No.	A1	A3	A5	<b>T</b> 7	T9	T11	No. 1	No. 2
Yield point, Lbs. per Sq. Inch	36480	38660	37960	37400	38130	37630	33140	33460
Tensile Str. Lbs. per Sq. Inch	50500	51100	50980	50820	51600	51050	49130	49220
Elongation—% in 8".	37.5	38.0	36.2	- 36.5	35.6	35.3	29.2	31.7
Reduction of Area—%	77.7	76.7	74.7	75.7	74.4	74.7	49.1	48.3
Fracture	36 Cup.	% Cup.	36 Cup.	36 Cup.	16 Cup.	36 Cup.	⅓ Cup.	% Cup.

Write for details and reports of other interesting tests

CENTRAL ALLOY STEEL CORP., Massillon, Ohio

AGATHON ALLOY STEELS

# SUNBEAM RELIABIL

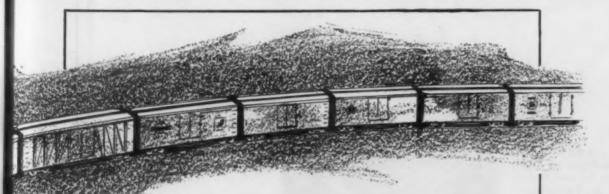


Sunbeam Rust-proof Headlight with Glass Reflector



is in service in every country in the world

### MEANS SAFETY

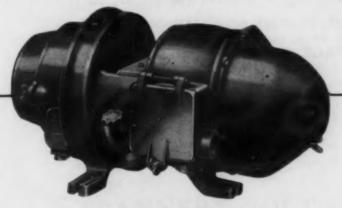


OCOMOTIVE Lighting is a safety factor of primary importance.

When the Turbo-Generator is also used in connection with train control it assumes an importance equal to that of the signals.

Sunbeam Turbo-Generators and Headlights are designed and built to meet satisfactorily the modern requirements of train control service and train operation. They have demonstrated their fitness by continuous successful service on many of the leading railroads of the country.

May we send you descriptive circulars and records of their performance?



Sunbeam Train Control Turbo-Generator Type R-4 (4-Poles)

#### SUNBEAM ELECTRIC MANUFACTURING CO.

Formerly Schroeder Headlight & Generator Co.

EVANSVILLE, INDIANA, U. S. A.

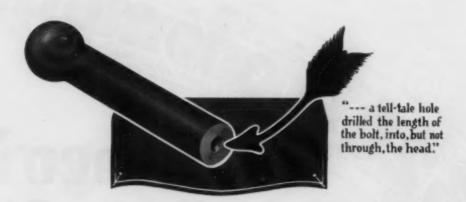
Builders of Locomotive Headlights Since 1883

Canadian Representative
TAYLOR AND ARNOLD ENGINEERING CO., LTD., MONTREAL, QUE.

General Export Representative
THE BALDWIN LOCOMOTIVE WORKS-PHILADELPHIA, PA.

# Subtraction means Addition

TRULY A PARADOX
BUT — READ THE
PAGE OPPOSITE



A small amount of metal is removed—subtracted—in making solid flexible bolts into Flannery Tell-Tale Bolts.

Subtraction of that metal adds materially to the value of the bolt.

Additional safety, for life and property, is secured, since the tell-tale hole in the bolt is automatically and continuously indicating its condition.

Additional economies are obtained in the use of Tell-Tale Bolts. Solid Bolts require stripping of the boiler and removal of caps in their inspection. Tell-Tale Bolts do not, as they are inspected from inside the firebox.

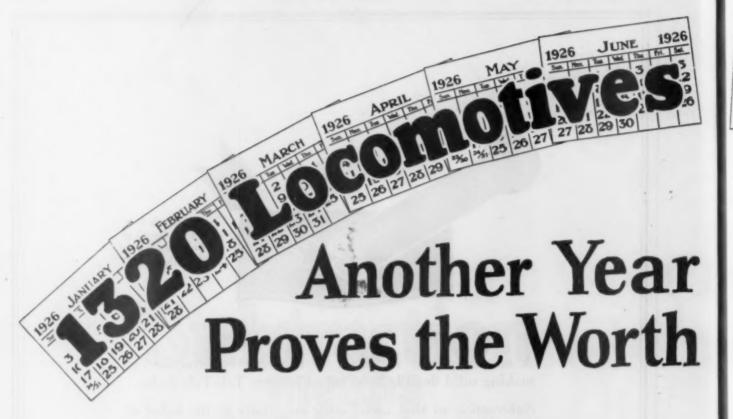
Your 1927 program should call for the use of Flannery Tell-Tale Bolts. Realize this added safety and economy of power operation.

1,150,000 Flannery Tell-Tale Bolts are now in use—evidence of the trend to full installations of this type of staybolt.

#### FLANNERY BOLT COMPANY

Flannery Building

Pittsburgh, Pa.



NINETEEN twenty-six has proven to be the greatest year in the history of railroading, not only from an operating viewpoint but also in the progress made towards lower maintenance costs and reduced store expense in the upkeep of locomotives.

Among the means and devices which have made possible the economies effected, Hulson Grates have proved their worth.

Starting the year with 610 applications on 17 roads, there is now equipped 1320 locomotives on 36 roads.

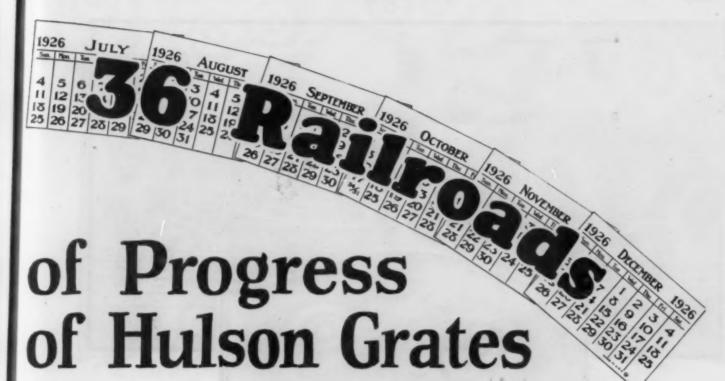
This increase is the result of extensive tests made by the railroads and proves that Hulson Grates are the solution to high costs and unsatisfactory service.

Detailed intormation will be

se



Hulson Gra Keoku



THE economies effected by Hulson Grates have not been confined to one department nor to one item of expense.

The stores departments have been able to standardize on 65% of their grate stock and reduce the amount carried 50%.

The mechanical departments have been able to reduce grate maintenance costs over 75% and materially speed up engine repairs.

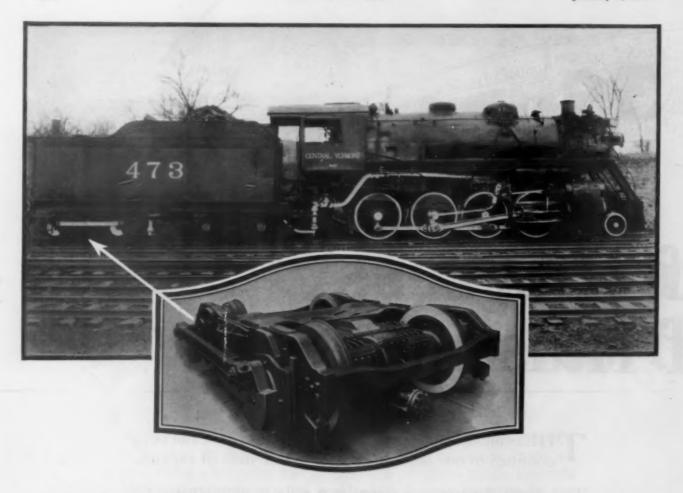
The operating departments have been able to extend locomotive runs, to effect consistent fuel savings from cleaner fires, and lessen terminal delays, especially at clinker pits.

sent to interested officials

e

te Company





# & Bethlehem Auxiliary Locomotive Utilizes Surplus Boiler Capacity

IN locomotive operation the maximum capacity of the boiler is never fully utilized at low speeds and at starting.

The Bethlehem Auxiliary Locomotive utilizes this surplus boiler capacity in developing additional draw-bar pull at starting and to overcome the handicaps of heavy grades, sharp curves and other conditions requiring abnormal tractive effort.

The desirable result is an increase in ton-miles per train hour and a corresponding reduction in fuel cost per ton-mile.

#### BETHLEHEM STEEL COMPANY

General Offices: BETHLEHEM, PA.

#### District Offices:

New York Beston Philadelphia Baltimere, Washington Atlanta Pittaburgh Scattle Buffale
Cleveland Cincinnati Detroit Chicago St. Louis San Francisco Los Angeles Portland
BETHLEHEM STEEL EXPORT CORPORATION, 25 BROADWAY, NEW YORK CITY
Sole Exporter of Our Commercial Products

# BETHLEHEM



# **A Vital Factor**

## On Those Extended Runs

T HE best of wearing materials is none too good for those locomotives now operating daily over two and three former divisions.

The most vital parts are those where HUNT-SPILLER GUN IRON is used—none are subjected to greater wear.

And because nothing better can be found is the reason why HUNT-SPILLER GUN IRON is specified by practically every railroad that has extended the locomotive's daily run.



Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings

# HUNT-SPILLER WFG CORPORATION W.B.Leach Pres. & Gen. Mgr. J. G. Platt, Vice-President

Office & Works

383 Dorchester Ave.

South Boston, 27, Mass.

Canadian Representative: Canuck Supply Ca., Ltd., 371 Aquaduct Street, Montreal, P. Q. Export Department: International Ray. Supply Ca., 30 Church Street, New York, N. Y.

# HUNT-SPILLER GUN IRON

"For Real Wear Where Wear Is Greatest"



These engines equipped with "Viloco" Improved Sanders, "Viloco" Bell Ringers and "Viloco" Rail Washers.

# Meritorious Devices

"VILOCO" Improved Sanders with "VILOCO" Improved Duplex Engineer's Valves.

"VILOCO" Automatic Rail Washers.

"VILOCO" Vacuum Type Bell Ringers.

"CRESCENT" Metallic Valve Stem Packing.

"CRESCENT" Metallic Piston Rod Packing.

In the construction of "VILOCO" specialties, the features of compactness, simplicity and durability have had thorough consideration from every angle, to reflect economies in application and maintenance costs, without impairing efficiency.

"VILOCO" IMPROVED SANDERS, operated by "VILOCO" IMPROVED DUPLEX ENGINEER'S VALVES, are a combination that have proven VERY SUPERIOR, and the marked increase in equipments being specified by the various railroads bespeaks the successful results that are being obtained. (Made in single, double, triple and quadruple designs, as well as special designs for unusual conditions.)

"VILOCO" AUTOMATIC RAIL WASHERS—This device works automatically with the locomotive sanders. Improvements embodied have made this device very popular and its use materially assists in increased tonnage due to clean rails after engine passes over the sand.

"VILOCO" VACUUM TYPE BELL RINGERS — Constructed so the annoyance of revolving bells is entirely overcome. The vacuum created by the plunger pulling out of the piston results in a positive and cushioned stop, eliminating any jar or shock. Recently put on the market and more than 800 already in service.

"CRESCENT" METALLIC VALVE STEM AND PISTON ROD PACKING—Standard on many and used substantially on a large number of railroads. The superior design of the "CRESCENT" PACKING SEGMENTS insures increased mileage and reduced maintenance cost.

We also manufacture "VILOCO" UNCOUPLING LEVER ATTACHMENTS and "VILOCO" BRAKE BOOSTERS for application to freight car equipment, and these devices have the same relative merits as all of our other specialties.

Complete information on request. -

# VILOCO RAILWAY EQUIPMENT CO.

General Office

14 E. Jackson Blvd.,
Chicago, Ill.

Factory
Benton Harbor,
Mich.



# "STANDARD" LOCOMOTIVE SPECIALTIES

"OKADEE" BLOW-OFF VALVES, SCREWED AND FLANGED

"OKADEE" BLOWER VALVES

"OKADEE" FRONT END HINGES

"OKADEE" TENDER HOSE COUPLERS

"OKADEE" WATER GLASS PROTECTORS

"OKADEE" AUTOMATIC CYLINDER COCKS

"OKADEE" AUTOMATIC DRAIN VALVES

The above devices need practically no introduction as they are and have been "standard" equipment on the majority of railroads for years.

MANUFACTURED WITH EXTREME CARE.
PROMPT AND DEPENDABLE SERVICE.
LITERATURE AND COMPLETE INFORMATION ON REQUEST.

## THE OKADEE COMPANY

General office

14 E. Jackson Blvd.,
Chicago, Ill.

Factory
Benton Harbor,
Michigan.





# An Important Factor In Economical Operation



THIS briefly explains the reason why leading railroads are specifying the Chambers Front End Throttle Valve for their superheated power.

Performance reports from mechanical supervisors in charge of operation and maintenance quickly convince executives that the Chambers Throttle Valve offers positive savings in fuel consumption and repair costs.

And all the engineers like it because it responds to every movement of the lever insuring them perfect control over their locomotives at all times.

THE BRADFORD CORPORATION

NEW YORK 25 West Forty-third St. CHICAGO Railway Exchange



BRADRORD





# The Most Costly Pipe in the End is the Cheapest in the Beginning

Look for the Spiral Knurled Mark. It positively and easily identifies Reading Genuine Wrought Iron Pibe

THE railroad that uses steel pipe thinks "Reading" is too expensive. The railroad that has profited from the extraordinary long life of Reading Genuine Wrought Iron Pipe thinks steel is too expensive.

What is your opinion?

## READING IRON COMPANY READING, PA.

World's Largest Manufacturers of Genuine Wrought Iron Pipe

Boston Pittsburgh St. Louis Cincinnati Los Angeles Phliadelphia Chicago Baltimore Seattle Tulsa Pal'as Buffalo Detroit

# READING PIPE

# Long Life and Steam Tight

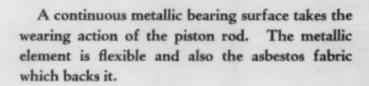


Air Pump Packing

RE-PACKING an air pump, a feed water pump or a Booster Ball Joint involves much more expense than just the cost of new packing.

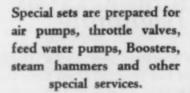
That is why the longer life of "V" Pilot Packing is more important than the saving in packing costs would indicate.

Shopping-to-shopping is the ideal for any material of this character and "V" Pilot has the wear resistance to realize this ideal.



Any unevenness in the rod is quickly compensated for by the easy adaptability of the packing.

You can rely on "V" Pilot to give a long life of steam tight service.





Stoker Engine Packing



Steam Hammer Packing



Feed Water Heater Packing



Booster Ball Joint Packing

#### PILOT PACKING CO., Inc.

Jos. Sinkler, General Mgr. Peoples Gas Building, Chicago

One Water Street New York Monadnock Building San Francisco

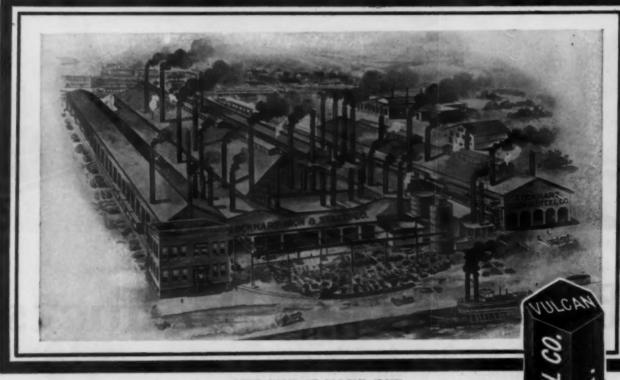
W. P. & R. S. Mars, Duluth, Minn.



Throttle Packing



# VULCAN



"THE HOME OF VULCAN IRON"

### SAFE

Vulcan
Bloom Staybolt Iron

Vulcan
Iron Forging Bloom

Vulcan Engine Bolt Iron There is not the least possibility of segregation in VULCAN IRON.

The reason is simple—made of layer upon layer of many plies of metal—welded—forged. It is entirely free from the usual structural defects—a better, safer iron—ideal for Locomotives and Car requirements.

We invite you to visit our plant, inspect our process and methods—you will be welcome any time.

Our Laboratory, too, is open to you for any physical or structural tests you may care to make.

> DIRECT MILL REPRESENTATIVES DE REMER-BLATCHFORD CO. CHICAGO, ILL.

LOCKHART IRON & STEEL CO. PITTSBURGH, PA.

THE IRON
WITH A BUILT-UP
STRUCTURE

LOCKHART



Year after year for more than a century

# **Burden Iron Products**

have contributed much to the more efficient and economical operation of railroads.

R AILROAD confidence gained forbids a lower standard than that which for more than a century has been inseparably associated with product bearing the name Burden.

Rigid adherence to the principle of worth in materials and manufacture is daily being reflected in the delivery of unchanging quality and performance to the buyer of Burden Iron Products.

We have all just rounded the curve of time and find ourselves in 1927 let this year set a new record in lower cost through more efficient operation by selecting Burden Iron for

> SMALL FORGINGS STAYBOLTS RIVETS CHAIN ETC.

THE BURDEN IRON COMPANY
NEW YORK



PYLE-NATIONAL locomotive headlights, turbo-generators, and other railway electrical equipment is used on the crack trains and on all other classes of service by a great majority of all the railroads of the world.

Pyle-National equipment will deliver for you exactly the same kind of superior performance that has brought this universal acceptance on other roads.

Pyle-National railway electrical equipment includes a complete line of fittings and wiring appliances for locomotive, shop, and floodlighting installations, as well as headlights, turbo-generators, floodlight projectors and floodlight towers.





Canadian Agents:

The Holden Company, Ltd. Montreal, Winnipeg, Vancouver, Toronto.

Export Department:

International Railway Supply Company 30 Church Street, New York City.

Branch Offices:

3509 Grand Central Terminal, New York City.

310 S. Michigan Avenue, Straus Bldg., Chicago.

815 Boatmen's Bank Bldg., St. Louis, Missouri.

311 Builders Exchange Bldg., St. Paul, Minnesota.

### The Pyle-National Company

General Offices and Works:

1334-1358 North Kostner Avenue, Chicago, Ill., U. S. A.



RA 1-1-Gray

# THE PILLIOD COMPANY

SPECIALISTS IN

# Locomotive Valve Gears

MANUFACTURERS OF

BAKER SOUTHERN YOUNG

VALVE GEARS

# The New BAKER Long Lap—Long Travel Gear

DESIGNED FOR USE WITH LIMITED CUT-OFF EMBODIES THESE DEFINITE IMPROVEMENTS

- 1.—Larger Port Openings
- 2.—Longer Expansion
- 3.—Less Pre-admission
- 4.—Decreased Back Pressure
- 5.—Equalized Valve Events
- 6.—Improved Lubrication

OVER 1000 IN USE ON 23 IMPORTANT RAILROADS.

TOTAL BAKER GEARS IN SERVICE 11,500

30 Church St. New York City

Works:-Swanton, Ohio

Railway Exchange Chicago, Ill.

# 1926 A Year of Progress

From reports already available many new records in railroad operation have been set up in 1926. Some of these are almost unbelievable in view of previous performances. It is evident, altho final figures are not yet at hand, that 1926 recorded the most effective use of locomotive fuel. Also, since we have just passed thru the first million-cars-a-week year on record, the figures for tonnage per train and average train-load will undoubtedly show substantial improvement.

These are all reflections of the spirit prevailing in American railroading, today, as any advance is due in large part to the management and their co-workers. But the efforts of those men are enhanced by the facilities at their command. High efficiency motive power is a deciding factor behind any operating records that may be set up. During the year, there has been notable development in steam locomotives.

High steam pressures and temperatures were used in the newer locomotives to a greater degree than in any preceding year, and orders were placed for more than 400 larger capacity locomotives. Hence, more attention was directed to the Elesco type "E" superheater. A large majority of these powerful locomotives were equipped with this type of superheater.

The year has also been noteworthy for

the increase in the utilization of exhaust steam for feed water heating. Elesco feed water heaters have been applied to a large number of the outstanding modern locomotives built during the year. In fact, this apparatus has been applied in greater numbers than in any previous year. Its simplicity, dependability and performance are winning friends wherever it is in service. It meets any capacity requirement, no matter what is the size of the locomotive, or the service conditions. No modification of engine operation is necessary to realize full benefits.

The success of both of these devices is based on sound business principles: A spirit of co-operation with the railroads. A familiarity with railroad and locomotive requirements. With these are combined the engineering knowledge and experience essential to proper design, backed by a service organization capable of co-operating with the user to the end that the best results from the equipment may be had in operation.

Elesco superheaters have been applied to nearly 52,000 American-built locomotives. Over 2,000 locomotives are equipped with Elesco feed water heaters on more than sixty railroads. Both of these proven devices stand ready to assist the railroads in setting up even better records in the years to come.

#### THE SUPERHEATER COMPANY

17 East 42nd Street NEW YORK



Peoples Gas Building CHICAGO

Canada: The Superheater Company, Limited, Montreal

FEED WATER HEATERS

SUPERHEATERS

EXHAUST STEAM INJECTORS

# PRIME Cab Windshield Wings





Nothing contributes more to safety than clear vision for the engineer. His view down the right-of-way must be clear in all weathers.

Prime Cab Windshield Wings provide free sight ahead despite snow, sleet, rain or other "window clouding" weather. These Wings are equipped completely with heavy, polished, plate glass.

Prime construction permits easy adjustment with one hand; and once set in position

the window will not rattle or work loose.

#### Prime Clear Vision Windows

Many of the world's largest railroads have used Prime Clear Vision Windows as standard equipment for the past ten years.

Twenty-three sizes in stock ready for immediate delivery. Choice of several styles of opening devices. Shipped complete, ready for instant installation.

Write for descriptive literature.

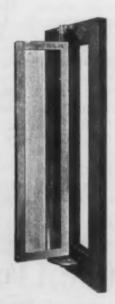
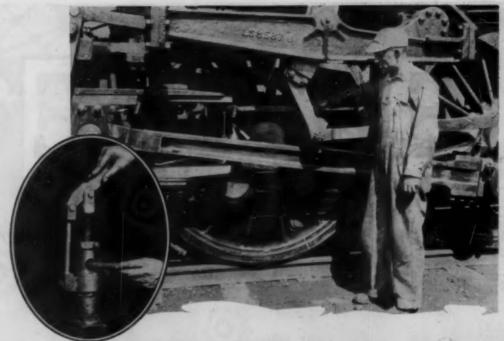


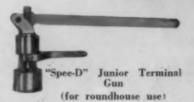
Illustration shows Prime Windshield Wings. Quick, easy operation with one hand is a salient feature.

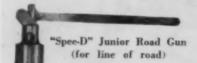
# PRIME MANUFACTURING COMPANY MILWAUKEE, WISCONSIN

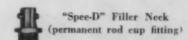












# Here's Your Opportunity For Big Savings

L EADING railroads are rapidly standardizing on the "Spee-D" Rod Cup Lubrication method—and there's a good reason why.

One engine preparer with a "Spee-D" High Pressure Gun can easily fill every rod cup on the largest non-articulated locomotive inside of five minutes.

Better lubrication is assured because a pressure of 5,000 lb. per sq. in. can be exerted with any type of "Spee-D" Grease Gun and grease of the hardest known consistency may be used.

The "Spee-D" method not only insures speedier preparation of locomotives with a big savings in time and labor but also eliminates the old style grease plug which is so troublesome and expensive.

Let us tell you exactly what we can save you on every locomoing equipped.

### RELIANCE MACHINE & STAMPING WORKS, Inc.

Manufacturers and Distributors

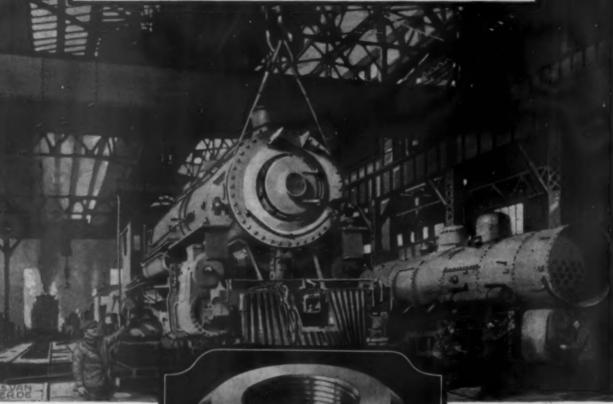
864-866 Tchoupitoulas St. 16

New Orleans, La.



"Saves Time, Labor, Grease and Plugs"

# BOLTS & NUTS





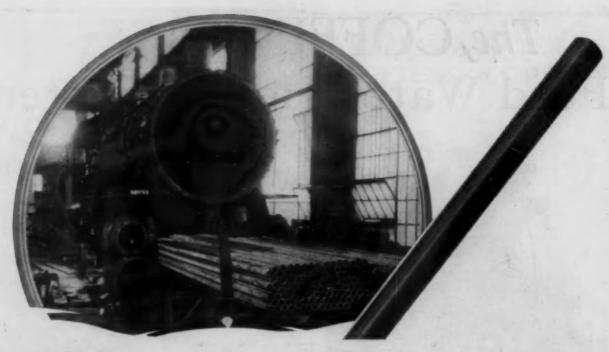
EMPIRE COLD-PUNCHED STEEL NUTS . . . REAL ECONOMY . . REDUCE MAIN-TENANCE COSTS



RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY 
 PORT CHESTER, N.X.

Consul Minos Bids Pacery: one pickens times 1-pi-cil Brownth In

EMPIRE NEW PROCESS BOLTS . THREADS OF GAUGE-LIKE ACCURACY . . . WRITE FOR SAMPLES



# When the Cost

## and Loss Is Known

LASS I railroads are spending over \$16,200,-000.00 annually to replace corroded, pitted and worn out boiler tubes.

This means that over 3.5 per cent of the entire cost for repairs to steam locomotives is spent every year for labor and materials on new boiler tube replacements.

Careful selection of boiler tubes will help to decrease this tremendous repair cost.

Figure out the cost and loss on your road. Order a few sets of Tyler Charcoal Iron Tubes and then compare the results with your previous perform-

We are always ready to help you make a test.

### The Tyler Tube & Pipe Co.

WASHINGTON, PENNSYLVANIA

SPECIAL REPRESENTATIVES

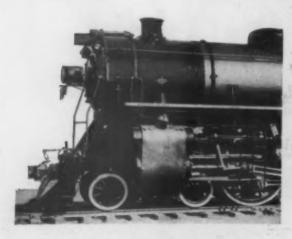
W. M. MacCleary, 2 Rector St., New York W. H. S. Bateman & Company, Philadelphia, Pa.

OTHER REPRESENTATIVES

A. M. Castle & Company
Chicago, Illinois and Seattle, Wash.
San Francisco, Los Angeles, Calif.
Bourne-Fuller Co., Cleveland, Ohio
George W. Denyven, Boston, Mass.

ER Charcoal Ivon

# The COFFIN Feed Water Heater System



The position of the heater on the locomotive affords a balanced weight

#### The Heater

The Heater Smooth surfaces and high Stays velocity without tube restriction keep scale from accumulating when the heater is working.

Any scale formed when water is at rest tends to flake off by the expansive movement of the arch shaped tubes.

Steam circulation is positive. There are no dead areas.

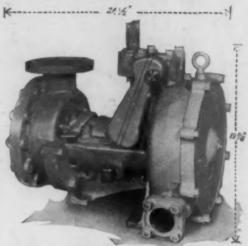
Proper venting prevents the sucking of front end gases into heater during drifting.

The Heater Expansion and contraction is

Stays
Tight
provided in the arch of the tube, thus eliminating expansion heads or special tube joints—usually a serious item of maintenance.

The Heater The Coffin Heater delivers the list highest attainable feed water temperatures under the widest range of operating conditions and per square foot of heating surface, weighs approximately one-half that of any other heater on the market.

The J. S. COFFIN, Jr., Company
Trust Company Building at Journal Square
Jersey City, New Jersey



The Pump weighs only 381 pounds and does not upset locomotive balance

#### The Centrifugal Pump

The Centrifugal pump is rapidly replacing all other types in boiler feed service and because of space and weight limitations it is particularly appropriate for locomotive application.

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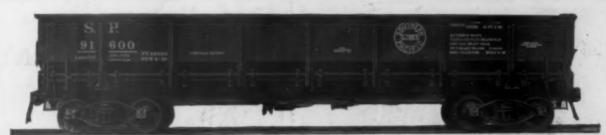
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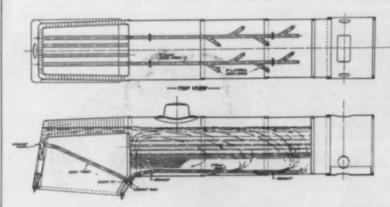


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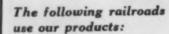
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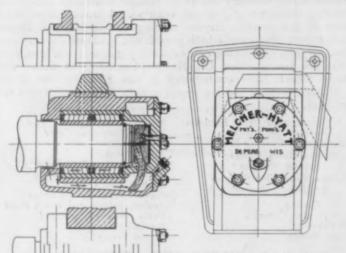
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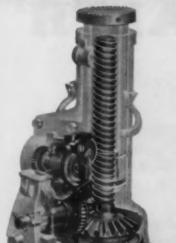
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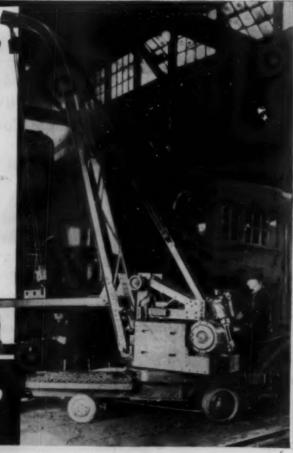
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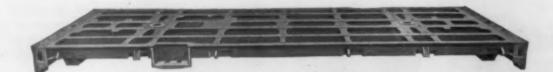
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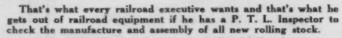
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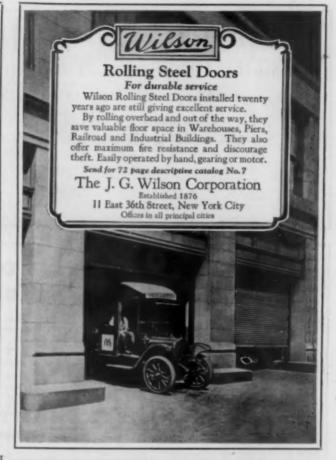
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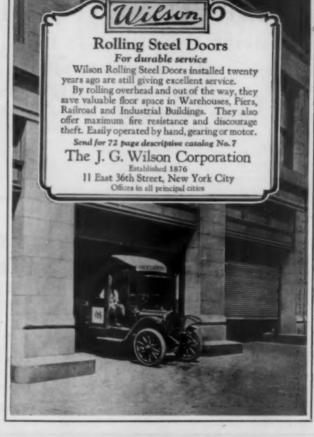
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- Car maintain a traveling speed of more than 15 miles an hour nulling three leaded cars.

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  Has a radius of leads from center of rotation. of 30 feet 10 inches. Will reach 28 feet from the track center with a 3,500 pound pile without blocking.

  Will drive piles with a batter of 2½ inches per feet.

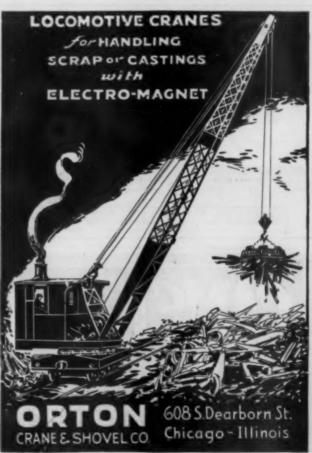
  Has a boiler with 900 square feet of heating surface and a pressure of 165 pounds per square inch.

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A SEPTEM





### WHY A LEAK-STOP IT

BAD ORDER CARS cause the loss of many dollars to railroad companies and shippers of grain and seed.

MUCH OF THIS LOSS can be saved by the use of Kennedy Car Liners. These car liners practically condition a bad order car and enable shippers to load cars that otherwise would be rejected.

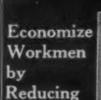
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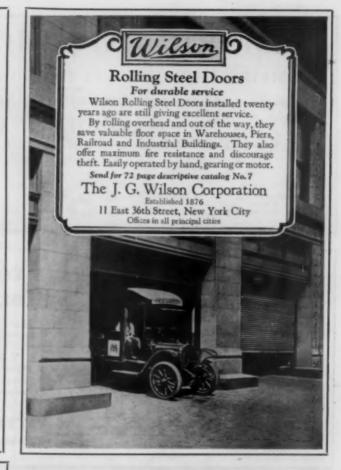
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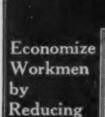
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Brake Brake Beam Co.

Brake Drums.

Hunt-Spiller Mfg. Corp.

Brake, Forgings, Pins, Lavers.

Etc.

American Steel Foundries.

Davis Brake Beam Co.

Notional Ry. Appliance Co.

Ricel Car Forze Ca.

Western Ry. Equipment Co.

Breke Heads.

American Steel Foundries.

Chicago Ry. Bquipment Co.

Breke Heads.

American Recel Foundries

Chicago Ry. Bquipment Co.

Brake Beam Co.

Koupel Industrial Car &

Equipment Co.

Breke Jaws.

National Malleable & Steel

Contines Co.

Breke Jaws.

National Malleable & Steel

Pressed Steel Car to, ireke Jawa. National Mallenble & Steel Castings Co, National Ry. Appliance Co. Pittsburgh Knife & Forge

Schaefer Boulpment Co.

Brake Shoes.

American Brake Shoe & Foundry Co.
American Steel Foundries.
Buckeye Steel Castings Co.
Fort Pitt Maileable Iron
Co.
Wheel Truing Brake Shoe
Co.

Brake Steps, Safety. Irving Iron Works.

Irving Iron Works.
Brakes, Air.
General Electric Co.
Westingbouse Air Brake Co.
Brakes, Electric.
Westingbouse Air Brake Co.
Brakes, Hand.
Miner, W. H.
National Malleable & Steel
Castings Co.
Union Ry. Equipment Co.
Wine Ry. Appliance Co.
Bridge Ry. Appliance Co.

Bridge Builders.
American Bridge Co.
Arnold Engineering Co., The.
Bethlehem Steel Co.

Bridge Stringers-(See Stringers, Bridge.) ers, Bridge.)
Buckets, Clam Shell.
Blaw-Knox Co.
Hayward Co.
Industrial Works.
McMyler Interstate Co.
Orton & Steinbrenner Co.

Orton & Steinbronn Buckets, Drag Line, Hayward Co.

Buckets, Grab. American Bridge Co. American Hoist & Derrick

American Hoist & Derric Co. Blaw-Knox Co. Hayward Co. Industrial Works. McMyler Interstate Co. Orton & Steinbreauer Co.

Buckets, Electric Motor, Hayward Co. Buffers, Priction.
Miner, W. H.
Standard Coupler Co.
Waugh Bullpment Co.
Westinghouse Air Brake Co.

Westinghouse Air Brake Co.
Buffers, Radial.
Franklin Railway Supply
Co., Inc.
Building Material.
Celotex Co., The.
Johns-Manville, Inc.
Robertson Co., H. H.
Rildiume, Tran. Steel and

Buildings, Iron, Steel and Steel Concrete. American Bridge Co. Arnold Bingineering Co., The. Blaw-Knox Co. McClellan & Junkersfeld Inc. Robinson Co., Dwight P.

Robinson Co., Dwight P.
Buildings, Steel.
American Bridge Co.
Buildonars.
Ryersom & Son., Joseph T.
Buses, Motor.
American Car & Foundry
Motors Co.
Fageol Motors Co.
International Motor Co.
Mack Trucks, Inc.
Studebaker Corp. of America.

Buzzer Systems.

Buzzer Systems.

Buzzer Systems.

Electric Service Supplies Co.
Cable Accessories, Electrical, Electric Service Supplies Co.
Cables, Electric.
American Steel & Wire Co.
General Electric Co.
Kerite Insulated Wire &
Cable Co.
Okonite Co., The,
Western Electric Co.
Cableways—(See Tramways).
Callpers.

Calipers.
Lufkin Rule Co., The.
Car Floats.
American Brown Bover
Electric Corp.
Car Lighting Equipment —
(See Lighting. Car Equipment) Brown Boveri

(See Lighting, Our Equipment).
Car Liners, Paper.
Kennedy Car Liner & Bag Co.
Carlines, Chicago, Cieveland Car Roofing Co.
Hutchins Car Rfg, Oe
Koppel Industrial Car &
Equipment Co.
Proceed Steel Car Co.
Railway Devices Co.
Western Ry, Equipment Co.

Car Material, Wood. Duncan Lumber Co.

Exchange Sawnilla Sales Co.

Industrial Lumber Co.

Newman Lumber Co., J. J.

Car Movers.
National Ry. Appliance Co.
Car Parts and Appliances.
Koppel Industrial Car &
Equipment Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp. Car Parts, Freight,
Koppel Industrial Car &
Equipment Co.

Pressed Steel Car Co Tennessee Coal, Iron & R. R. Co.

Car Repairs.

Koppel Industrial Car & Equipment Co.

Pressed Steel Car Co
Tennessee Coal, Iron & R. B. Co.

Dar Steps, Safety, Irving Iron Work Cars, Air Dump. Western Wheeled Scraper

Cars, Ballast.

Koppel Industrial Car & Equipment Co.
Mt. Verson Car. Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars. Convertible. Mt. Vernon Car. Mfg. Co.

Mt. Vernon Car. Mfg. Co.
Cars. Dump.
Clark Car Co.
Differential Reel Car Co.
Koppel Industrial Car &
Equipment Co.
McMyler interstate Co.
Magor Car Corp.
Mt. Vernon Car. Mfg. Co.
Western Wheeled Scraper
Co.

Car Ends, Steel. Chicago, Cleveland Car Roofing Co.

Cars, Flat, Narrow Gauge. Western Wheeled Scraper Co.

Ob.

Ors. Freight.

Koppel Industrial Our & Equipment Co.
Mt. Vernon Car. Mfg. Co.
Pressed Steel Car Ou.
Pullman Car & Mfg. Co.
Balaton Steel Car Ou.
Tennessee Coal, Iron &
R. B. Co.

R. H. Co.
Cars, Freight (New and Repaired).
Newport News Shipbuilding & Dry Dock Co.
Koppel Industrial Our & Equipment Co.
Pressed Steel Car Co.

Pressed Steel Car Co.
Oars, Gaseline-Electric,
Electric Motive Co.
Oars, Hand, Fush, Motor, Inspection.
Buda Co., The.
Fairbanks, Morse & Co.
Fairment Railway Motora
Inc.
Mudge & Co.

Cars, Industrial.

Fonter Co., L. B.

Koppel Industrial Car & Equipment Co.

Pressed Street Car Co

Western Wheeled Scraper Co. Whiting Corp.

CB.
Whiting Corp.
Cars. Motor.
Railway Motors Corp.
Cars. Motor (Weed Mewer).
Clark Car Co.
Fairmont By. Motors, Ise.
Mudre & Co.
Cars. Ore.
Chark Car Co.
Koppel Industrial Car &
Buipment Co.
Pressed Sirel Car Co.
Cars. Passengar.
Electro Motive Co.
Koppel Industrial Car &
Buipment Co.
Pressed Steel Car Co.
Cars. Passengar.
Electro Motive Co.
Koppel Industrial Car &
Buipment Co.
Prilman Car & Mfg. Corp.
Cars. Power Units.
Electro Metive Co.
Cars. Quarry.
Wentern Wheeled Scraper
Co.

1

Oars, Rebuilt and Repaired.

Koppel Industrial Car & Equipment Co.
Mt. Vernon Car Mfg. Co.

Yressed Steel Car Ce.

Western Wheeled Scraper Co.
Cars. Refrigerator.
Koppel Industrial Car &
Equipment Co.
Mt. Vernon Car Mfg. Co.
Vreased Steel Car Co.
Cars. Bocond-Hand.
Fits-Hugh, Carter H.
Koppel Industrial Car &
Equipment Co. Koppel Industrial Car as Equipment Co. Pressed Stevi Car Co Western Wheeled Scraper Equipment Co. Zelnicker Supply Co., Walter A. s. Belf-Propelled Passes Cars, Soif-Propelled Passonger.
Electro Motive Co.
General Electric Co.
Cars, Spreader.
Jordan Co., O. F.
Western Wheeled Scraper
Co.
Cars, Tank.
Koppel Industrial Car &
Equipment Co.
Pennsylvania Car Co.
Pennsylvania Tank Line,
Pressed Steel Car Co.
Cars, Trailer.
Fairmont Ry. Motors, Inc.
Mudge & Co.
Cars, Velocipedo.
Buda Co., The. Cars, Buda Co., The.
Carts, Dump.
Carts, Wheeled Scraper Co. Castings, Brass and Bronse. Keystone Bronse Co. Magnus Co., Inc. More-Jones Brass & Metal Coatings, Electric Locsmative Commonwealth Steel Co.
Castings, Grey Iron.
American Brake Shoe & Foundry Co.
American Locomotive Co.
Baldwin Locomotive Works.
Locomotive Finished Material Co. Baldwin Locomovice
Locomotive Finished Matorial Co.
Ramapo Ajax Corp.
Castings, Gun Iron.
Hunt-Spiller Mfg. Corp.
Castings Malleable Iron.
American Malleable Castings Assn.
Buckye Steel Castings Co.
Chicago Ry. Equipment Co.
Fort Pitt Maileable Iron
Co. Koppel Industrial Car & Equipment Co. National Mailcable & Steel National Malicable & Steel Castings Co. P. & M. Co., The. Pressed Steel Car Co. Symington Co., The. Universal Draft Gear Atsymington Co., The.

Universal Draft Gear Attachment Co.

Castings, Mickel.

International Motor Co.

Castings, Steel.

Allegheny Steel Co.

American Locomotive Co.

American Bteel Foundries.

Bethlehem Steel Co.

Birdsboro Steel Foundry &

Machine Co.

Buckeye Steel Castings Co.

Commonwealth Steel Co.

Edgewater Steel Co.

Edgewater Steel Co.

McConwey & Toricy Co.

Midvale Co., The

National Maileable & Steel

Castings Co.

Newport News Shipbullding

& Dry Dock Co.

Pressed Steel Car Co.

Rtandard Steel Works Co.

Tennessee Coal, Iron &

B. H. Co.

Union Spring & Mfg. Co. Union Spring & Mfg. Co Pnion Steel Coating Co Universal Draft Gear Attachment Co.
Castings. Steel Loca
Birdsboro Steel Foundry Castings. Reel Lore
Birdsboro Steel Foundry
Machine Cb.
Obio Steel Foundry Co.
Onion Steel Casting Co.
Castings. Steel Vanadium.
Birdsboro Steel Foundry
Machine Co.
Ohio Steel Foundry Co.
Onion Steel Foundry Co.
Caitle Guards.
Railroad Supply Co.

Cement.
Portland Cement Assn. Cement, Car Roofing. Lucas Co., Robert M. Cement, High Temperature. Johns-Manville, Inc. Center Plates—(See Bearings, Center). Center Bills. Bradford Corp. Chain.
American Chain Co., Inc. Chain, Tapes. Lufkin Bule Co., The. General Electric Co.
Westinghouse Elec. & Mfg.
Co.
Clamps, Flanging.
Ryerson & bous, Joe. T.
Clamps, Guard Rail.
American Chain Co., Inc.
Buda Co., The.
Q & O Co., The.
Clamps, Rese.
National Malleable & Steel
Castings Co.
Westinghouse Air Brake Co.
Clamps, Pipe.
Franklia Railway Supply
Co., Inc.
Mudge & Co.
National Malleable & Steel
Castings Co.
Railway Devices Co.
Western Ry. Equipment Co.
Clamps, Plate Handling.
Bafety, Horizontal and
Vertical.
Never Slip Safety Clamp
Co.
Cleaners, Flue.
Ryerson & Sons, Jos. T.
Coach and Coach Yard Steam
Jeints—(See Jeints, Etc).
Coal Ore and Ash Handling
Machines.
Hayward Co.
McMyler Interstate Co. Coal Ore and Ash Handling Machines.

Hayward Co.
McMyler Interstate Co.
Orton & Steinbrenner Co.
Roberts & Schaefer Co.
Coal Sprinklers.
Nathan Mfg. Co.
Coaling Stations.
American Bridge Co.
Fairbanks, Morse & Co.
Ogle Construction Co.
Roberts & Schaefer Co.
Cocks, Angle.
Westinghouse Air Brake Co.
Cocks, Cylinder.
Prime Mfg. Co., The.
Cocks, Cylinder Antomatic.
Okadee Co., The.
Cocks, Gauge.
Prime Mfg. Co., The.
Columns, Water.
Prime Mfg. Co., The.
Compounds, Beller.
Bird & Archer Co., The.
Dearborn Chemical Co.
Compounds, Freservative
Beller.
Garratt-Caliahan Co.
Compressors. Air.
American Brown Boveri Boiler.
Garratt-Caliaban Co.
Compressers. Air.
American Brown Boveri
Electric Corp.
General Electric Co.
Ingersoil-Rand Co.
Western Electric Co.
Worthington Pump & Mehy.
Corp.
Concrete Floor Slabs.
Federal Cement Tile Co.
Concrete Roofing. Tile.
American Steel & Wire Co.
Ryerson & Sons. Jos. T.
Concrete Roofing. Tile.
Federal Cement Tile Co.
Condensors.
Ingersoil-Rand Co.
Condensing Apparatus.
Ingersoil-Rand Co.
Worthington Pump & Machinery Corp.
Conduits. Metallic Fiscible.
Rarco Mfg. Co.
Franklin Bailway Supply
Co., Inc.
Graybar Electric Co., Inc.

Oenduits, Underground. Johns-Manville, Inc. Graybar Electric Co., Inc. Connections.
Prime Mfg. Co., The. Connections, Truck Lever.
National Malleable & Steel
Castings Co.
Schaefer Equipment Co. Connectors, Automatic, T. P. — (See Train Connectors, Automatic). connectors, Electrical,
Electric Service Supplies
Co.
Ohio Brass Co., The
Westinghouse Elec. & Mfg.
Co. Cribbing Units.
Federal Coment Tile Co. Westinghouse Elec. & Mfg.
Ob.
Contact Wire.
Bridgeport Brass Co.
Controliers, Electrical.
American Brown Boveri
Electric Corp.
General Electric Co.
Westinghouse Elec. & Mfg.
Co.
Convesters, Steel.
Whiting Corp.
Cenveying Machinery.
American Bridge Co.
Hayward Co.
Industrial Works.
McMyler Interstate Co.
Ogle Construction Co.
Orton & Steinbrenner Co.
Conveyor, Ash — (See Coal,
Ore and Ash Mandling
Mach.).
Couplers. Cressheads and Shoes. Barco Mfg. Co. Cross Arms.
American Bridge Co.
Graybar Electric Co., Inc.
Western Electric Co. suplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply
Co., Inc.
A Torley Co. McConway & Torley Co. National Malleable & Steel Castings Co. Okadee Co., The Castings Co.
Okadec Co., The
Railrond Supply Co.
Standard Coupier Co.
Westinghouse Air Brake Co.
Coupier Focksts—(See Braft
Yekes).
Coupiers, Radial.
Ohto Brass Co., The
Couplings, Flexible.
Falk Corp., The
Couplings, Heese.
Fort Pitt Mallenble Iron Co.
Gold Car Heating & Lighting Co.
Ingersoil-Rand Co.
Westinghouse Air Brake Co.
Covering, Seat, Rattan—(See
Battan).
Cranes. Crushers, Coal.
Orton & Steinbrenner Co.
Culverta.
American Rolling Mill Co.
The. Rattany.
Crance.
Bucyrus Co.
Crances, Crawling Shovels and
Draglines.
Industrial Works.
Crances, Electric Traveling.
Industrial Works.
Manning, Maxwell & Moore,
Inc.
Colors & Co., Inc., Wm. The.
American Sheet & Tin
Plate Co.
Armeo Culvert & Flume
Mfrs. Assn.
Cupolas, Foundry.
Whiting Corp.
Cups. Oil.
Hammett H G. Cups. Oil.
Hammett, H. G.
Cups. Oil and Grease.
Frime Mfg. Co., The.
Curtains and Fixtures, Car
Window.
National Lock Washer Co.,
The. Manning, Maxwell & Moore, Inc.
Sellers & Co., Inc., Was.
Whiting Corp.
Cranes. Electric, Industrial
Truck Mounted.
Baker-Raulang Co., The.
Cranes, Gantry.
Industrial Works.
McMyler Interstate Co.
Orton & Steinbrenser Co.
Whiting Corp.
Cranes. Jib.
Industrial Works.
McMyler Interstate Co.
Tale & Towne Mfg. Co.
Cranes, Lecemetive.
American Hoist & Derrick
Co. Window.
National Lock Washer Co.,
The.
Curtains, Steel Rolling.
Wilson Corp., J. G., The.
Cushions, Meter Car.
Mudre & Co.
Cutters. Flus.
Reserson & Sonn. Jos. T.
Cutting and Welding Apparatus.
Westinghouse Elec. & Mfg.
Coologedias. Railway.
Simmons-Boardman Publishing Co.
Cyclopedias. Railway.
Simmons-Boardman Publishing Co.
Cylinders. Gas. Acetylene.
Etc.
National Tube Co.
Cylinders. Lecometive.
Lacometive Pinished Material Co.
Cylinders. Parts (Finished and Rough).
Lecomotive Pinished Material Co.
Derails.
Q & C Co. The.
Railroad Supply Co.
Derricks.
Carnegie Steel Co.
Hayward Co.
Industrial Works.
International Derrick & Equipment Co.
McMyler Interestate Co.
Derricks.
Hand and Steel,
Traveline.
Hayward Co. Oranes, Locemetive.
American Hoist & Derrick
Co., Industrial Works.
McMyler Interstate Co., Ohio Locomotive Crane Co.,
Orton & Steinbrenner Co.
Cranes. Pertable.
American Huist & Derrick
Co.,
Elwell-Parker Electric Co.,
Industrial Works.
McMyler Interstate Co.,
Orton & Steinbrenner Co.
Cranes, Tractor.
Industrial Works.
Orton & Steinbrenner Co.
McMyler Interstate Co.,
Orton & Steinbrenner Co.
Cranes, Tractor Crawling.
Industrial Works.
Cranes, Traveling.
Yale & Towne Mfg. Co.
Cranes Wreaking.
Industrial Works.
McMyler Interstate Co.,
Ortones. Wreaking.
Industrial Works.
McMyler Interstate Co.,
Orton & Steinbrenner.
Crank Pins — (See Pins,
Crank).

Devices, Safety, Motor Car. American Oreosoting Co.
American Oreosoting Co.
Ayer & Lord The Co.
Century Wood Preserving
Lo.
Colonial Creosoting Co.
Georgia Creosoting Co.
International Creosoting &
Constr. Ca.
Jennison Wright Co.
Michigan Wood Preserving
Co. Fairmont Hailway Motors,
Inc.
Mudge & Co.
Diesel Electric Power Plants.
Fairbanks, Morse & Co.
Digging Machines,
Buda Co., The.
Disinfectants,
Chipman Chemical Engineering Co.
West Disinfecting Co.
Ditching Machinery. Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co. Ditching Machinery.

American Hoist & Derrick American Hoist & Derrick Cb.,
Bucyrus Co.
Bayward Co.
Industrial Works.
Jordan Co., O. F.
Orton & Steinbrenner Co.
Dividers.
Lufkin Rule Co., The.
Door Fixtures—(See Fixtures,
Gar Door).
Deer, Lecometive, Fire-Bex.
Frankin Railway Supply
Co.
Doors, Car. Cb. Crossing-Gates.
Buda Co., The.
Oressings — (See Fregs and
Crossings). Deer, Lesemetive, Fire-Bex.
Franklin Railway Supply
Corn.
Doors, Car.
Camel Co.
Miner, W. H.
National Ry. Appliance Co.
Union Ry. Suulpment Co.
Western Ry. Equipment Co.
Western Ry. Equipment Co.
Deers, Folding, Rolling and
Sliding,
Kinnear Mfg. Co.
Deers, Folding, Rolling and
Sliding,
Kinnear Mfg. Co.
Deers, Grain.
Exchange Sawmills Sales Co.
Deers, Folding, Rolling and
Sliding,
Kinnear Mfg. Co.
Deers, Grain.
Exchange Sawmills Sales Co.
Deers, Wood.
Kinnear Mfg. Co.
Deers, Wood.
Kinnear Mfg. Co.
Dears, Wood.
Kinnear Mfg. Co.
Dears, Wood.
Kinnear Mfg. Co.
Draft Arms.
American Steel Foundry &
Machine Co.
Bradford Corp.
Symington Co., The.
Universal Draft Gear Attachment Co.
Walker Draft Gear Corp.
Walker W. H.
National Maileable & Steel
Castings Co.
Railway Devices Co.
Standard Coupler Co.
Symington to. The.
Universal Draft Gear Attachment Co.
Walker Irraft Gear Corp.
Walker Irraft Gear Corp. Cross Ties.

Ayer & Lord Tie Co.

Century Wood Preserving

Co. Co.
Duncan Lumber Co.
Exchange Sawmills Sales Co.
Industrial Lumber Co.
Long-Bell Lumber Co.
Michigan Wood Preserving Oo.

New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co. Cross Ties, Creeseted,
American Creeseting Co.
Century Wood Preserving Co. Colonial Creosoting Co. Colonial Creosoting Co. International Creosoting & Construction Co. Michigan Wood Preserving Co. Michigan Wood Preserving Co. New England Wood Pre-serving Co. Ohio Weed Preserving Co. Pittsburgh Wood Preserving Siandard Coupler Co.
Symington vo., The.
I'mion Draft Gear Oc.
Universal Draft Gear Attachment Co.
Walker I'rrit Gear Corp.
Walker I'rrit Gear Corp.
Waugh Equipment Co.
Western Ry. Equipment Co.
Western Ry. Equipment Co.
Western Ry. Equipment Co.
Western Ry. Equipment Co.
Draft Gear Attachments.
Nymington Co., The
Draft Tokes.
American Steel Foundries.
Buckey Steel Castings Co.
Keyoke Ry. Equipment Co.
McConway & Torley Co.
Miner. W H
National Malleable & Steel
Castings Co.
Symington Co., The
Universal Draft Gear Attachment Co.
Drawbar Contering Device.
Miner, W. H.
Italon Ry. Equipment Co.
Waugh Equipment Co.
Drawbars, Posh Cars and
Trailers.
Mudge & Co.
Drawbars, Posh Cars and
Trailers.
Mudge & Co.
Drawbars, Ugit Eafety.
Franklin Railway Supply
Co., Inc.
Dredging Machinery.
Hayward Co.
Industrial Works.
Drilling Machines.
Seilers & Co., Inc., Wm.
Drilling Machines.
Rock.
General Electric Co.
Ingersoil-Rand Co.
Drilling Machines, Topright
and Eagial.
Ryerson & Bon, Joseph T.
Drilla,
Ingersoil-Rand Co.
Drilli, Bonding, Track.
Buda Co., The. Drills.
Ingersoil-Rand Co.
Drills, Bending, Track.
Buda Co., The.
Brills. Cose Comer.
Independent Pneumatic Tool
Co.
Ingersoil-Rand Co.

Drilla, Concrete. Ingersoll-Rand Co. Orills, Earth. Buda Co., The. Drills, Electric. Independent Pneumatic Tool Co.
Drilla, Pneumatic.
Ingersoil-Band Co. Drills, Steel Rock and Steel Sharpened. Ingersoil-Rand Co. Drills, Track.
Railroad Supply Co. Drills, Track and Bonding.
Bird-Archer Co., The.
Ingersoit-Rand Co.
Drinking Fountains. Taylor Co., Halsey W., The.
Driving Boxes (Extended
Main).
Franklin Railway Supply
Co., Inc. Franklin Railway Supply
Co., inc.
Drop Door Mechanism.
Wine Ry. Appliance Co.
Drop Tables, Electric.
Whiting Corp.
Drynames — (See Generators,
Electrics).
Electrical Instruments.
Westen Biectrical Instrument Corp.
Electric Corp.
Electric Corp.
Electric Corp.
Electric Corp.
Electric Electric Co., Inc.
Ohio Erass Co., The
Westinghouse Elec. & Mig.
Co.

Co. Electrification, Bailroad. Brown Boveri Corp. Electric Corp.

Battey & Kipp.

General Electric Co.

McClellan & Junkersfeld. Inc.
Ohio Brass Co., The
Robinson Co., Dwight P.
Smith & Co., C. H.
Westinghouse Mec. & Mfg. Cu.
Elevators, Grain.
American Brown Boveri

Electric Corp. Lowe Bros Co., The Enamels and Lacquers. Berry Bros. Ends. Steel. Cleveland Car

Chicago, Cleveland Car
Roofing Co.
Hatchine Car Rfg. Co.
Union Metal Products Co.
Engineers and Contractors.
Battey & Kipp.
Day & Elimmerman, Inc.
Roberts & Schaefer Co.
Robinson Co., Dwight P.
Engineers, Construction,
Arnold Engineering Co., The
Battey & Kipp.
Day & Elimmerman, Inc.
McClellan & Junkersfeld,
Inc. erts & Schnefer Co

Roberts & Schaefer Co.
Robinson Co., Dwight P.
Engineers, Consultins, Civil,
Elec., Hydraulic. Mech.
Arnold Bugineering Co., The.
Battey & Kipp.
Day & Zimmerman, Inc.
Hust Co., Robert W.
Mushfeld, John B.
Smith & Co., C. E.
Engineers. Centracting.
Arnold Engineering Co., The.
Battey & Kipp.
Hust Co., Robert W.
McClellan & Junkersfeld,
Inc.

McClellan & Junkerefeld, Inc.
Mublifeld, John H.
Smith & Ca., C. H.
Ingineers. Inspecting.
Arnold Engineering Co., The.
Hunt Co., Robert W.
Muhlfeld, John H.
Pittsburgh Testing Laboratory.

Smith & Co., C E. Smith & Co., C E.
Engineers Valuation.
Arnold Engineering Co., The.
Hunt Co., Robt. W.,
Smith & Co., C. B.
Engines, Crade and Fuel Off.
Fairbanks, Morse & Co.,
Ingersoll-Rand Co.,
Worthington Pump & Michy.
Corp.

Faik Corp., The
Foos Gas Engine Co., The.
Engines, Cas and Cassline.
Buda Co., The.
Fairbanks, Morse & Co.,
Ingereoli-Rand Co.,
Mudge & Co.,
Worthington Pump & Mehy.
Co. Engines, Diesel. Falk Corp., The

Engines, Gaseline. American Car & Foundry American Car & Foundry Motors Co. Centinental Motors Corp. Fageol Motors Co. Fairmont Railway Motors,

Inc.
Engines, Hoisting.
American Hoist & Derrick
Co.
Continental Motors Corp.
Industrial Works.
McMylor Interstate Co.
Orton & Steinbreaner Co.
Engines, Oil.
Falk Corp., The

Falk Corp., The
Expanders, Tube.
Ryerson & Son, Joseph T.
Fans, Exhaust and Ventilating.
General Electric Co.
Graybar Electric Co., Inc.
Mudge & Co.

Fare Bexes and Registers. Electric Service Supplies

Fasteners, Car Door, Arnold Engineering Co., The. Camel Co. Fort Pitt Malleable Iron

Fort A. W. H.

National Malicable & Steel
Castings Co.
Foed Water Heater Systems.
Coffin, Jr., Co., J. S.
Foncius, Wire — (See Wire

Food Wasse.

Foncing, Wire — (See Wire Fence).

Foncing, Wood.

Duncan Lumber Co.

Ferre Molybdarum.

Vanadium Corp. of America.

Ferre Yanadium.

Vanadium Corp. of America.

Ferre Vanadium Corp. of America.

Fitters, Water and Industrial.

American Water Softener

Co.

Filtration Plants, Water.

American Water Softener

Co.
Filtration Plants, Water.
American Water Softener
Co.
Fire Apparatus.
International Motor Co.
Mack Trucks, Inc.
Fire Fighting and Protoction
Equipment.
Johns-Manville, Inc.
Fireboxes.
American Locomotive Co.
Baidwin Locomotive Co.
Baidwin Locomotive Works.
Fittings, Air Brake.
Railway Devices Cc.
Western Ry. Buulpment Co.
Westinghouse Air Brake Co.
Fittings, Malleable.
Crane Co.
Fittings, Malleable.
Crane Co.
Fixtures. Gar Deer.
Camel Co.
Miner, W. H.
National Malleable & Steel
Castings Co.
Union Ry. Equipment Co.

Castings Co.
Union Ry. Equipment Co
Western Ry. Equipment (
Flanged Fittings.

Crane Co.
Fiangers, Bnow.
Q & C Co., The.
Floodlights.
Electric Service Supplies Co.
Graybar Electric Co., Inc.
Westinghouse Electric &
Mfg. Co.

NTR. Co.
looring.
Exchange Sawmilla Sales Co.
Industrial Lumber Co.
Jennison Wright Co.
Johns-Manville, Inc.
Long-Bell Lumber Co., The

Long-Bell Lumber Co., 1
Flooring, Bus.
Tuco Products Corp.
Flooring, Car.
Tuco Products Corp.
Flooring Compositions.
Johns-Manwille, Inc.
Tuco Products Corp.
Flooring, Composition Car.
Tuco Products Corp.
Flooring, Steel.
Irving Iron Works.

Ayer & Lord Tie Co. Century Wood Preserving Co. Co.

Duncan Lumber Co.

Exchange Sawmills Sales Co.
Industrial Lumber Co.
Long-Bell Lumber Co.
Michigan Wood Preserving

Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co. Flue Cleaners—(See Cleaners, Flue).

Fine Cutters — (See Cutters, Fine). Flues, Beiler — (See Tubes. Beiler).

Fine Shep Equipment. Ryerson & Son, Jos. T. Forges, Rivet Heating. Ryerson & Son, Jos. T.

Ryerson & Son, Jos. T.

Fergings,
American Bridge Co.
Amserican Bteel Foundries.
Andrews Steel Co., The
Bethlehem Steel Co.
Edgewater Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Johnson & Co., J. B.
Koppel Industrial Car &
Equipment Co.
McMyler Interstate Co.
Midvale Co., The
National Ry. Appliance Co.
Newport News Shipbuilding
& Dry Deck Co.
Pittaburgh Knife & Forge
Co.

Co. Pressed Steel Car Co. Steel Car Forge Co. Tennessee Coal, Iron Tennessee Coal, Iron & E. R. Co.
Tuco Products Corp.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Pittsburgh Knife & Forge Co. Union Switch & Signal Co.

Forms, Steel (For Cenerate Construction).
Blaw-Knox Co.
Fundations.
Smith & Co. C. E.
Fundary Equipment.
Hanna Engineering Works.
Whiting Corp.
Feundry Sand Handling.
Equipment.
Hayward Co.
Foundry Supplies.
Bird-Archer Co., The,
Whiting Corp.
Frames. Locomotive Co.
American Locomotive Works.
Bird-Archer Co.
Onlo Steel Foundry & Machine Co.
Ohlo Steel Foundry & Co.
Ohlo Steel Foundry Co.
Onlo Steel Foundry Co.
Union Steel Foundry Co.
Frames. Moter Car.
Fairmont Bailway Motors,
Inc.
Mudge & Co.
Frames. Truck.
American Locomotive Co.
American Steel Foundry &
Machine Co.
Buckeye Steel Castings Co.
Frankin Bailway Supply
Co., Inc.
Koppell Industrial Car &
Equipment Co.
Ohlo Steel Foundry Co.
Frankin Bailway Supply
Co., Inc.
Koppell Industrial Car &
Equipment Co.
Scullis Steel Co.
Symington Co., The.
Frames. Vanadism.
American Locomotive Co.
Baldwin Locomotive Co.
Baldwin Locomotive Co.
Bross Vanadism.
American Locomotive Co.
Buda Co., The.
Froster Co., L. R.
Ramsno Ajax Corp.
Froga, Wrecking.
Buda Co., The.
Foster Co., L. R.
Ramsno Ajax Corp.
Froga, Wrecking.
Buda Co., The.
Foster Co., L. R.
Ramsno Ajax Corp.
Froga, Wrecking.
Buda Co., The.
Foster Co., L. R.
Ramsno Ajax Corp.
Froga, Wrecking.
Buda Co., The.
Folorums. Brake Beam.
American Steel Foundries.
Chicago Ry. Equipment Co.
National Malleable & Steel
Castings Co.

Furnaces, Electric. General Electric Co. Furnaces, Melting. Whiting Corp.

Furnaces, Rivet Heating— (See Forges, Rivet Heat-ing).

Gage Testers—(See Testers, Gage).

Gage).
Gages, Steam.
Ashton Valve Ce.
Gages, Wheel Press Recording.
Ashton Valve Ce.
Gates, Orcessing.
Buda Co., The.
Railroad Supply Co.
Gates, Presumatic.
Railroad Supply Co.
Gauges.

Rairroau
Gauges,
Manning, Maxwell & Moore,
Inc.
Gauges, Dopth, Thickness and
Conter.
Univ. Ch., The,

Conter.
Lufkin Rule Co., The.
Sauges, Track.
Buda Co., The.
lear and Pinions.
American Steel Foundries.
National Ry. Appliance Co.
Tuco Products Corp.
Westinghouse Elec. & Mfg.

Co. Oear Blanks, Rolled St Standard Steel Works Gears.
Falk Corp., The Gears, Silent.

Falk Corp., The
Gears, Silent,
General Electric Co.
Gears, Valve — (See Valve
Gears).
Generators, Assiyiene.
Oxweld Acetylene Co.
Generators, Car Lighting.
Safety Car Heating &
Lighting Co.
Generators. Electric
American Brown Boveri
Electric Corp.
Moctric Service Supplies
Co.
Fairbanks. Morse & Co.
General Electric Co.
Graybar Electric Co., Inc.
Westinghouse Mec. & Mfg.
Co.
Glass. Wire.

Westinghouse Mec. & Mfg.
Co.
Class. Wire.
Mississippi Wire Glass Co.
Gongs. Motor Car.
Mudze & Co.
Graders. Elevating.
Western Wheeled Scraper
Co.

Western Wheeled Scraper Co.
Graphite, Lubricating.
Frankin Railway Oil Ce.
Grapples, Wood.
Hayward Co.
Grate Bars.
Q & C Co., The.
Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.
Grates, Locomotive.
Hulson Grate Co.
Gratins Steel.

Grating Steel.

Huison Steel.
Grating Steel.
Irving Iron Works.
Grating, Steel Floor.
Blaw-Knox Co.
Grease Forming Machines.
Franklin Railway Supply
Co., Inc.
Ryerson & Fon. Jos. T.
Grinders, Internal.
Micro Machine Co.
Grinders, Portable.
Ruda Co., The.
Grinding Machines.
Sellers & Co., Inc., Wm.
Orinding Machines. Portable
Incorpolit. Rund Co.,
Guard Rail.

Grinding Machines, Portable Incorrectly Rand Co., Guard Rail, Enda Co., The. Guard Rails, Foot Guard. Q & C Co., The. Guard Rail (One Piece). American Chain Co., Inc., Ramano Aiax Carp. Guard, Switch Point. Q & C Co., The. Guard, Switch Point. Q & C Co., The. Guards. Cattle. American Bridge Co., Guards. Dust. Railway Devices Co., Symington Co., The. Western Ey. Equipment Co. Guards. Incandescent Lamp. Electric Service Supplies Co. Guards. Incandescent Lamp. Electric Review Supplies Co. Guards. Grease High Pressure. Reliance Machine & Stamping Works, Inc.

Furnaces, Annealing and Case
Hardening.
Whiting Corp.
Furnaces, Electric.
Hammers, Chipping.
Independent Pneumatic Tool

Hammers, Drop. Sellers & Co., Inc., Wm Hammers, Fraumatic, ingersoil-liand Co. Western Electric Co. Hammers, Riveting. Independent Pneumatic Tool

Independent Pneumatic Tool
Co.
Ingersoll-Band Co.
Hammers, Scaling.
Independent Pneumatic Tool
Co.
Hammers, Steam.
Industrial Works.
Sellers & Co., Inc., Wm.
Hand Brakes—(See Brakes,
Hand).
Hangers, Car Door—(See Fixtures, Car Door).
Hangers, Door, Boundheuse
Shops.
Bichards & Wilcox Co.

Richards & Wilcox Co. Headight Reflectors and

Headiight Beflecters and Cases.
Biectric Service Supplies Ce.
Buda Co., The.
Headiight Repair Parts.
Buda Co., The.
Buetric Service Supplies Co.
Headiights, Electric.
Buda Co., The.
Biectric Service Supplies Co.
General Electric Co.
Fyle-National Co.
Westinghouse Elec. & Mfg.
Co.

Co. Headlights, Motor Cars.

Mudge & Co. Headlining. Haskelite Mig. Corp. Heaters, Electric Bivet. American Hoist & Derrick

Heaters, Foodwater. Superheater Co., The. Heaters, Foodwater, Station-

Superheater Co., The.

Heaters, Feedwater, Stationary,
Worthington Pump & Mehy.
Oerp.
Heating Systems, Oar (Electric and Steam),
Gold Car Heating & Lighting Co.
Safety Car Heating & Lighting Co.
Heating To Appliance Co.
Heating and Ventilating Apparatus.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Heavy Electric Traction.
Bridgeport Brass Co.
Hinges, Front End.
Okadee Co., The
Heisting Machinery.
American Bridge Co.
Industrial Works.
McMyler Interstate Co.
Ogle Construction Co.
Orton & Steinbreaner Co.
Hoists, Air.
Hanna Engineering Co.
Independent Pneumatic Tool
Co.
Roists, Chain.

Ingersoll-Rand Co Hoists, Chain.

Hoists, Chain. Ryerson & Son, Joseph T. Hoists, Coach. Whiting Corp.
Hoists, Electric.
American Hoist & Derrick

American Hoist & Derrick
Co.
Yale & Towne Mfg. Co.
Hoists, Locemetive.
McMyler Interstate Co.
Whiting Corp.
Hoists, Pertable Car.
Whiting Corp.
Hoists, Pertable Car.
Whiting Corp.
Hoists, Penumatic.
Ingersoll-Rand Co.
Whiting Corp.
Hoists, Becond-Hand.
Hyman-Michaels Co.
Holders, Angle Cock.
Mudge & Co.
Railway Devices Co.
Hooks, Wrecking.
National Maileable & Steel
Castings Co.

National Malleable & Steel
Castings Co.
Heras, Compressed Air.
American Strombee Co.
Hose, Air. Steam, Etc.
Ingersoil-Rand Co.
Hose, Tender.
Prime Mfg. Co., The.
Westinghouse Air Brake Co.

Ingets.
Andrews Steel Co., The Andrews Steel Co., The Birdsboro Steel Foundry Machine Co. Carnegie Steel Co. Edgewater Steel Co. Illinois Steel Co. McConway & Torley Co.

Injectors.
Manning, Maxwell & Moore,

Injectors, Exhaust Steam.

Inspection of Material and Equipment — (See Engi-neers. Inspection).

Inspirators, Manning, Maxwell & Mo

Insulating Lumber. Celotex Co., The Insulation, Car.
Celotex Co., The.
Johns-Manville, Inc. Johns-Manville, Inc. Lebon Co., The. National Ry. Appliance Co. Nelson Mfg. Co., B. F. Tuco Products Corp. Union Asbestos & Rubber

Union Co.

Insulation, Electrical.

Electric Service Supplies Co.
General Electric Co.
Johns-Manville, Inc.

General Electric Co.
Johns-Manville, Inc.
Insulation, Heat.
Celotex Co., The.
Johns-Manville, Inc.
Miner, W. H.
Nelson Mfg. Co., B. F.
Insulators, Electrical.
Ohio Brass Co., The
Insulators, Procelain.
Ohio Brass Co., The
Insulators, Third Rail.
Ohio Brass Co., The
Insulators, Third Bail.
Ohio Brass Co., The
Insulators, Third Bail.
Ohio Brass Co., The
Insulators, Third Rail.
Ohio Brass Co., The
Switches and Bignals,
Railroad Supply Co.
Iron, Chain.
Burden Iron Co., The.

Railroad Supply Co.

Iron. Chain.

Burden Iron Co., The.

Falls Hollow stayboit Cr.

Lockhart Iron & Steel Co.

Iron, Charceal.

Ewald Iron Co.

Falls Hollow stayboit Co.

Lockhart Iron & Steel Co.

Iron, Engine Boit.

Lockhart Iron & Steel Co.

Iron Ferging Billets.

Lockhart Iron & Steel Co.

Iron Ferging Billets.

Lockhart Iron & Steel Co.

Iron. Hollow Stayboit.

Robinson Automatic Con
pectar Co.

nector Co.
Ryerson & Son, Joseph T.,
ron, Hollew Staybolt Bars.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.,
ron, Pla.
Illinois Steel Co.
Lockhart Iron & Steel Co.
ron, Redned.
Rundon Iron Co. The

Lockhart Iron & Steel Co. Iron, Refined.
Burden Iron Co., The. Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
National Ry. Appliance Co.
Reading Iron Co.
Ryerson & Son. Joseph T.
Iron Staybolt—(See alse Staybolts).
Burden Iron Co., The.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Robinson Automatic Cusnector Co.

Ryerson & Son, Joseph T.

Ryers
Jacks.
Buda Co. The.
Jacks, Lifting.
Jacks, Lorenton Co., A. O. Norton Co., Jacks, Smoke, Johns-Manville, Inc.
Joints, Air Bessrveir.
Barco Mfg. Co.
Franklin Railway Supply Barco Mfg. Co. Franklin Railway Supply Co., Inc. Joints, Blow Off Line (Round-

house).
Barco Mfg. Co.
Barco Mfg. Co.
Franklin Raffway Supply
Co., Inc.
otata, Goach and Coach Jotata, Coach Tard. Barco Mfg. Co. Pranklin Zaliway Supply Co., Inc.

Joints, Flexible.
Barco Mfg. Co.
Franklin Railway Supply
Co., Inc.

eints, Eail.
American Chain Co., Inc.
American Steel Foundrier
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Tennessee Coal, Iron &
R. R. Co. Joints, Rail.

Tennessee Coal, Iron & R. R. Co.

Joints, Steam, Air and Liquid.
Barco Mfg. Co.
Franklin Bailway Supply Co., Inc.

Journal Boxes and Lids.

Allegheny Steel Co., American Steel Foundries.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Railway Motors Corp.
Railway Motors Corp.
Railway Motors Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Kays, Brake Shee.
Bradford Corp.
Steel Car Forge Co.
Union Spring & Mfg. Co.
Knuckles, Emergency.

Knuckles, Emergency.
Q & O Co., The.
Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Labora

tory Ladders, Steel Car. Union Ry, Equipment Co. Wine Ry. Appliance Co.

Ladles, Whiting Corp. Lamps, Isoandescent,
Blectric Service Supplies Co.
General Electric Co.
Graybar Electric Co., Inc.
Westinghouse Elec. & Mfg.

Lath, Notal. American Rolling Mill Co.,

American
The.
General Fireproofing Co Lathes, Automatic Chucking and Turning. Bullard Machine Tool Co. Lathes, Axla. Sellers & Co., Inc., Wm.

Lathes, Engine, Ryerson & Son, Joseph T. Lathes, Turret. Sellers & Co., Inc., Wm. Lathes, Turret Vertical. Bullard Machine Tool Co.

Lathes, Wheel. Sellers & Co., Inc., Wm.

Sellera & Co., Inc., Wm.
Lead, White.
National Lead Co.
Lighting Equipment. Car.
Electric Storage Battery Co.
General Electric Co.
Gould Car Lighting Co.
Gould Storage Battery Co.,
Inc. Safety Car Heating & Lighting Co.

Lighting Fixtures and Sys-tems.

Electric Service Supplies

Co.
Line Material.
Bridgeport Brass Co.
Electric Service Supplies Co.
Graybar Electric Co., Inc.
Ohlo Brass Co., The
Lock Muts (See Mut Leeks).

Locks and Padiocks. Yale & Towne Mfg. Co. Locometives Repair Parts.
National By. Appliance Co.
Locometives, Coatracters'.
American Locometive Works.
Lima Locometive Works.
Locometives, Diesel.
American Brown Boveri

American Brown Boveri
Electric Corp.
Locometives, Electric,
American Locometive Co.
Raidwin Locometive Works.
General Electric Co.
Westinghouse Elec. & Mfg.
Co.
Locometives, Gaseline.
Raidwin Locometive Works.
Locometives, Gas-Electric.
Electra Metive Co.
Locometives, Caseline.
Lima Locometive Works.

Locemetives, Industrial,
American Locometive Co.
Raldwin Locometive Worl
General Electric Co.

Lecemetives, Oil, Engine, Electric Driven. Baldwin Locemetive Works Ingersoll-Rand Co.

coemetives, Mine.
American Locometive Co,
Baldwin Locometive Works.
General Electric Co.
Lima Locometive Works. Locomotives, Rebuilt.
American Lecomotive Co.

American Locomotive Co.
American Locomotive Co.
Baldwin Locomotive Works.
Lims Locomotive Works.
National Ry. Appliance Co.

Locomotives, Second-Hand.
Fitz-Hugh, Carter H.
Hyman-Michaels Co.
Zelnicker Supply Co., Walter A.

ter A.

Lucemotives, Steam;
American Locomotive Co.
Baldwin Locomotive Works
Lima Locomotive Works
Lima Locomotive Works
Long-Opintance Telephone

Service American Telephone & Tele graph Co.

Lubricants (Oil and Grease).
Associated Oil Co.
Franklin Railway Oil Co.

Lubricators, Driving Bez.
Franklin Railway Supply
Co., Inc. Lubricators, Piston Rods. Q & C Co., The.

Lubricators, Stationary. Nathan Mfg. Co.

Nathan Mig. Co.
Lamber.
Duncan Lumber Co.
Exchange Sawmills Sales Co.
Industrial Lumber Co., The
Newman Lumber Co., J (
West Coast Lumber Trade
Extension Buresu.
Lumber, Asbestos.
Johns-Manville, Inc.

Johns-Manville, Inc.

Lumber, Creessted.

American Creessting Co.

Ayer & Lord Tie Co.

Century Weed Preserving Co.

Colonial Creessting Co.

Georgia Creessting Co.

International Creessting &

Constr. Co.

Jennison-Wright Co.

Michigan Wood Preserving Co.

Co.

New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Machinery, Hydraulic.

Birdsboro Steel Foundry & Machine Co.

Magnets, Lifting. Industrial Works. Mechanical Draft Apparatus— (See Heating and Vant. App.).

(See Heating and Vent. App.).

Melteers, Snow, Electric.
Q & O Co., The.

Moters, Water and Oil.
Worthington Pump & Machinery Co.

Mierometers.
Lufkin Rule Co., The.
Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.
Mixing Machines, Cencrete.
Blaw-Knex Co.
Molybdenum Metal.
Vanadlum Corp. of America.
Monorali Switches and Turntables.
Yale & Towne Mfg. Co.
Monorali Switches and Turntables.
Yale & Towne Mfg. Co.
Monoral Electric.
Fairbanks. Morse & Co.
General Electric Co.
Graybar Electric Co., Inc.
Westinghouse Elec. & Mfg.
Co.
Moters and Generators.
Fairbanks. Morse & Co.
Motors, Ganeline.
Continental Motors Corp.

Mails.
American Steel & Wire Co
Interstate Iron & Steel Co
Reading Iron Co.
Ryerson & Son, Joseph T.

Nipples, Air Hess. Prime Mfg. Co., The.

Mezzies, Exhaust.
Franklin Railway Supply
Co., Inc.
Muts—(See Bolts and Nuts). Nut Locks. Graham Bolt & Nut Co.

Graham Bolt & Nut Co.
Grip Nut Co.
National Lead Co.
National Ry. Appliance Co.
Reliance Mfg. Co.
Standard Safety Nut Corp. Nuts, Tank Hose. Prime Mfg. Co., The.

Office Appliances.
General Fireproofing Co. Oil Cups.

Oil Filtering and Storage Systems. American Water Softener

Oil, Linseed. National Lead Co. Oils, Lubricating. Franklin Bailway Oil Co. Oil Plugs, Steam Chest, Franklin Railway Supply Co., Inc.

Ovens, Coil. Whiting Corp. Packing, Air Pump.
Johns-Manville, Inc.
Pilot Packing Co.
Union Asbestos & Rubber Co.

Union Asbestos & Rubber Co.
Packing, Cylinder and Vaive
Ring.
Finnt-Spiller Mfg. Corp.
Locemotive Finished Material Co.

Packing, Locomotive.
Johns-Manville, Inc.
Union Asbestos & Rubber Co.
Packing, Locomotive Cab Cock
Johns-Manville, Inc.
Union Asbestos & Rubber Co.

Packing, Metallic Piston Reds. Viloco Railway Equipment

Packing, Metallic, Valve Stem. Viloco Railway Equipment Co. Metallic, Valve

Packing, Ring Beiler.
Johns-Manville, Inc.
Union Asbestos & Rubber Co.
Packing, Semi-Metallie.
Pilot Packing Co.

Packing, Sheet.

Johns-Manville, Inc.

Union Asbestos & Rubber Co. Packing, Seft. Crane Co.

Crane Co.
Johns-Manville, Inc.
Pilot Packing Co. Packing, Throttle, Johns-Manville, Inc. Pilot Packing Co. Union Asbestos & Rubber Co.

Paints. Chipman Chemical Engi-

Paints.
Chipman Chemical Engineering Co.
Lehom Co., The
Lowe Bros. Co., The
Lucas Co., Robert M.
National Lead Co.
National Ry. Appliance Co.
Nison Mfg. Co., B. F.
Paint. Matal. Protective.
Lowe Bros. Co., The
National Lead Co.
Nelson Mfg. Co., B. F.
Paper. Car Lines (See Car
Lines, Paper).
Paper. Sheathing.
Chicago, Cleveland Car
Roofing Co.
Lebon Co., The.
Nelson Mfg. Co., B. F.
Pavement Breakers.
Intervall-Rand Co.
Poncils, Lead.
American Lead Pencil Co.
Pile Drivers.
Industrial Works.
McMyler Interstate Co.
Grion & Steinhrenser Co.
Piles, Telegraph or Tolophone.
Ayer & Lord Tie Co.
Piling.
Duncan Lumber Co.

riling, Creesoted,
American Creesoting Co.
Ayer & Lord Tie Co.
Century Wood Preserving Co.
Colonial Creesoting Co.
Georgia Creesoting Co.
International Creesoting &
Censtr. Co.
Jennison-Wright Co.
Michigan Wood Preserving
Co. Michigan Wood Preserving Co.
New England Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Piling, Sheet Steel.

American Bridge Co.
Carnegie Steel Co.

Pilot Beams, Cast Steel. Commonwealth Steel Co. Pins, Center. Miper, W. H.

Pins, Coupler, Knuckle.

McConway & Torley Co.

National Maileable & Steel
Castings Co.

Pipe Coverings. Union Asbestos & Rubber Co. Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Johnson & Co., J. R.

Pipe Fittings-(See Fittings, Pipe).

Pipe, Metal Culvert.
American Rolling Mill Co.,
The.
American Sheet & Tin Plate
Co.

Pipe, Wrought Iron. Rending Iron Co.

Planers.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
Plaster Base.
Celotex Co., The.
Celotex Co., The.

Plate Handling Safety Clamps, Horizontal and Vertical. Never Slip Safety Clamp Co.

Never Silp Salety Champ or.
Piates, Beiler, Firebox—(See Steel Firebox).
Piates, Center — (See Bearings, Center).
Plates, Fellower.
Steel Car Forge Co.

Flates, Fellower.
Steel Car Forge Co.
Piates, Iren and Steel.
American Rolling Mill Co.,
Their Carnegie Steel Co.,
Illinois Steel Co.,
Illinois Steel Co.,
Inlensis Steel Co.,
Interstate Iron & Steel Co.,
Ryerson & Son, Joseph T.,
Tennessee Coal, Iron &
R. R. Co.,
Plates, Monel Metal.
International Nickel Co.,
Plates, Tie.
Foster Co., L. B.
Illinois Steel Co.,
Inland Steel Co.,
Inland Steel Co.,
Inland Steel Co.,
Interstate Iron & Steel Co.,
National Malleable & Steel
Castings Co.,
Tennessee Coal, Iron &
R. R. Co.,
Plates, Tin and Terne.
American Sheet & Tin Plate
Co.,
Platforms. Car.

American Succe of Co.
Co.
Platforms, Car.
Commonwealth Steel Co.
Irving Iron Works.
Nandard Compler Co.
Plows, Railroad and Grading.
Western Wheeled Scraper

Standard Coupler Co.
Plows, Eaircoad and Grading.
Western Wheeled Scraper
Co.
Plews, Enew.
American Locomotive Co.
Jordan Co., O. F.
National Ry. Appliance Co.
Q & C Co., The.
Plugs, Oil and Grease Cup.
Prime Mfg. Co., The.
Plugs, Washout.
Prime Mfg. Co., The.
Plush, Mohair.
Mass. Mohair Plush Co.
Plywood, Panel and Interior
Trim.
Haskelite Mfg. Corp.
Pacumatic R. B., Gates.
Railroad Supply Co.
Pacumatic Rols.
Ingersoll-Rand Co.
Foles.
Duncan Lumber Co.
Graybar Electric Co., Inc.
Long-Bell Lumber Co.

Feles, Cressted. ales, Oreestell.
American Creeseting Co.
Ayer & Lord Tie Co.
Century Wood Preserving Co. Colonial Creosoting Co.

Georgia Oreosoting Co. Graybar Electric Co., Inc Constr. Co. Michigan Wood Preserving

Co.

New Engiand Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving
Co.

Peles, Signal.
Union Switch & Signal Co.

Posts.
Duncan Lumber Co.
Long-Bell Lumber Co. Post, Bumping. Buda Co., Th

Poets, Steel Fence.
American Steel & Wire Co.
Inland Steel Co.
Q & C Co., The.

Blasting-(See Ex Powder, Bla owdered Coal Equipment. Muhifeld, John E. Whiting Corp.

Power Plants.
General Electric Co.
McClellan & Junkersfeld,

Inc. Mublfeld, John B. Power Transmission Supplies. Sellers & Co., Inc., Wm. Pressivatives, Wood. Ayer & Lord Tie Co. Century Wood Preserving

Co.
Chipman Chemical Engineering Co.
General Fireproofing Co.
Jennison-Wright Co.
Michigan Wood Preserving

New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving

Co.
Pressed Steel Repair Parts.
Koppel Industrial Car &
Equipment Co.
Newpart News Shipbuilding
A Dry Dock Co.
Tennessee Coal, Iron & R. R. Co.

Presses, Flanging Rydraulic.
Birdsboro Steel Foundry &
Machine Co.

reases, Hydraulic, Birdsboro Steel Foundry & Macking Co.

Presses, Wheel.
Seilers & Co., Inc., Wm.
Southwark Fdry. & Machy

Southwark Fdry. & Machy. Co.

Pulverisers, Cual — (8 o o Orushers, Cual).

Pumping Stations.

Fairbanks, Moree & Co.

Pumps, Hydraulie.

Ingereoil-Rand Co.

Pumps and Pumping Machinser.

Firbanks, Moree & Co.

Ingereoil-Rand Co.

Worthington Pump & Mehy.

Corp.

Pumps, Vacuum.

Ingereoil-Rand Co.

Pumping and Shearing Machines.

Beatty Machine & Mfg. Co.

Ryerson & Sea. Joseph T

Punching Machines & Mfg. Co.

Puschings.

Lecomotive Stoker Co.

Prometers, Superheated

Superheater Co., The.

Racha, Ret and Ragrage.

Superheater Co., The.

Racks, Hat and Baggage,
Sellers & Co., Inc., Wm.

Radiators.

Badiators.
American Radiator Co.
Rail Benders.
American Obain Co., Inc.
Rail-Bonds.
American Steel & Wire Co.
Etciric Service Supplies Co.
General Electric Co., Inc.
Onio Brass Co., The.
Westinghouse Elec. & Mfg.
Co.

Eail Braces - (See Braces, Roofing, Asphalt Shingles, Rail).

Rail Cars. International Motor Co. Mack Trucks, Inc. Rail Laying Machines. Fairmont Ry. Meters, Inc.

Rail, Managanese.

Managanese Steel Rail Co.

Rail Reclamation Equipment.

Ryerson & Son, Joe. T. Rail Splice Plates - (See Joints, Bail).

Rail Washers. Viloco Railway Equipment

Railroad Shops.
Arnold Engineering Co., The. Railroad Structures — (Se Engineers and Centrac ters; also Building). (See

urnegie Steel Co Carnegie Steel Co.
Hyman-Michaels Co.
Hillands Steel Co.
Inland Steel Co.
Eyerson & Son. Jos. T.
Tennessee Conl., Iron &
E. R. Co.

Rails, New.
Foster Co., L. B.
Rails, Zelaying.
Hyman-Michaels Co.
Zelnicker Supply Co., Waitor A.

Zeinicker Supply Co., Walter A.,
Ratian.
Hale-Kilborn Co.
Heywood-Wakefield Co.
Record Systems.
Acme Card System Co.
Recifers for Signal Work.
General Electric Co.
Resis, Hose.
National Ry. Appliance Co.
Reforcers, Headlight.
Bisctric Service Supplies Co
Pyle-National Co.
Refrigerator, Car Squipment.
Union Ry. Equipment Co.
Refrigerator Car Insulation.
Colotex Co., The.
Refrigerators.
Wine Ry. Appliance Co.
Registers, Fare.
Ohmer Fare Register Co.
Reinferdings, Concrete.
General Fireproofing Co.
Replacers, Car.
American Chain Co., Inc.
National Ry. Appliance Co.
Replacers, Car.
American Chain Co., Inc.
National Ry. Appliance Co.
Replacers, Car and Locemetive.
Buda Co., The.

tive. Buda Co., The

Buda Co., The.
Reverse Goar, Pewer.
Barco Mfg. Co.
Franklin Railway Supply
Co., Inc.
Ringers, Bell.
Hammett, H. G.
Eailway Devices Co.
Viloco Railway Equipment
Co.
Wastern Rr. Panipment Co.

Oo.
Western Ry. Busipment Co.
Rivet Cutters.
Interstate Iron & Steel Co.
Riveters. Hydraulis.
Birdebore Steel Foundry &
Machine Co.
Southwark Fdry. & Machy.
Cb.

Riveting Machines.
Hanna Engineering Co.
Seilers & Co., Inc., Wm.

Bourse Toller Mfg. Co., The
Bourne-Fuller Mfg. Co., The
Burden Iron Co., The.
Champion Rivet Co.
Luland Steel Co.
Koppel Industrial Car &
Equipment Co.
Pressed Steel Car Ce.
Russell, Burdmil & Ward
Bolt & Nut Co.
Ryerson & Son, Joseph T.
Cold, Monel Metal Nickel.
International Nickel Co.

Rods, Monel Metal Nickel.
International Nickel Co.
Rods, Welding.
Oxweld Acetylene Co.
Rolls, Bending and Straightening.
Birdsboro Steel Foundry &
Machine Co.
Rollsr Bearings—(See Bearings. Reller).
Roof Insulation.
Celoter Co., The.
Roofing, Asbeatos.
Johns-Manville, Inc.
Robertson Co., H. H.

Rooding, Building.
American Rolling Mill Co.

The.
Johns-Manville, Inc.
Lehon Co., The.
Nelson Mfg. Co., B. F.

Roofing, Car.
American Rolling Mill Co. The.
American Sheet & Tin Plate

American several description of the Co. Chicago, Cleveland Car Roofing Co. Hutchins Car Roofing Co. Johns-Manvillo, Inc. Lebes Co., The. National Ry. Appliance Co. Nelson Mfg. Co., B. F.

Roofing, Corrugated.

American Rolling Mill Co., The. American Sheet & Tin Plate

Co. Johns-Manville, Inc. Robertson Co., H. H. Roofing, Tile. Federal Coment Tile Co.

Roofing, Tin, American Shoot & Tin Plate

Boedag, Wood.
Exchange Sawmills Sales Co.
Industrial Lumber Co.
Raps. Wirs — (See Wirs
Rops).

Rotary Converters.

American Brown Boveri
Electric Corp.
Rules, Wood, Steel and Alu-

minum. Lufkin Rule Co., The, unning Boards, Car and Lo-

comotive.
Irving Iron Works.
Runways, Car and Locomotive
Irving Iron Works.
Rust Preventatives.
Dearborn Chemical Co.
Safety Devices, Meter Car.
Fairment Railway Motors.
Inc.

Inc.

Mudge & Co.
Saddles, Runing Beard.

Miner, W. H.
Safe Ends.

National Tube Ce.
Safes, Allsteel.
General Firepreeding Co.
Safety Railings, Motor Cars.

Mudge & Co.
Sand Drying Flants.

Roberts & Schaefer Co.
Sanders, Losemetive.

Mudge & Co.
Sanders, Losemetive.

Viloco Railway Equipment
Co.
Santary Products.

Co.
Sanitary Products.
West Disinfecting Co.
Saah Balanose.
Edwards Co., O. M.
Tuco Products Corp.
Saws, Circular Metal.
Ryerson & Son. Jeseph T.
Saws, Portable Rail.
Industrial Works.
Q & C Co., Tho.
Scales.
Fairbanks, Morse & Co.

Scales. Fairbanks, Morse & Co. Scrapers, Cable, Drag. Hayward Co.

Hayward Co.

Sorapers, Whoeled and Drag.
Western Wheeled Seraper
Co.
Soreens, Passenger Car.
Theo Products Corp.
Seats, Car.
Hale-Kilbarn Co.
Heywood-Wakefield Co.
Securities, Investment.
Trask & Co., Spencer.
Shafting,
Falls Hellow Staybelt Co.
Johnson & Co., J. R.
Sellers & Co., J. R.
Shapers.

Bellers & Co., Inc., Wm.
Shapers.
Bellers & Co., Inc., Wm.
Ryerson & Son. Janoph T.
Shapes. Pressed Steel.
Koppel Industrial Car &
Equipment Co.
Pressed Steel Car Co.
Shapes. Structural.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Interstate Iron & Steel C.
Interstate Iron & Steel C.

Interestate Iron & Steel Co.
Ryerson & Ron. Jacoph T.
Tennecace Coal, Iron &
R. R. Co.

Shapers, Ryerson & Son. Jeseph T. Sheathing. Celotex Co., The

Meds, Train.

American Bridge Co.

Arnold Engineering Co., The.

Sheets. Black and Galvanized.

Allegheny Steel Co. American Rolling Mill Co. The. erican Sheet & Tin Plat-

Inland Steel Co.

Ryerson & Son, Joseph T. Sheets, Blue Annealed. Allegheny Steel Co.

Sheets, Corrugated.
American Rolling Mill Co. The.

American Shoot & Tin Plate
Co.

Co. Carnogie Steel Co. Inland Steel Co. inland Steel Co. Johns-Manville, Inc. Robertson Co., H. H. Ryerson & Son, Joseph T.

Sheets, Electrical.
American Rolling Mill Co. The.
American Shoot & Tis Plate
Co.

Ryerson & Son, Joseph T.

Sheets, Locemetive Jacket.

American Bolling Mill Co. merican Rolling Mill Co., The. merican Sheet & Tin Plat-Co.

Inland Steel Co. Shoets, Monel Metal Nickel. International Nickel Co.

Sheets, Plain. Inland Steel Co. Sheets, Polished or Planished Iron. American Shoot & The Plate Co.

Sheets, Steel. Rolling Mill Co.

American Rolling Mill Co The. Inland Steel Co. Ryerson & Nos. Joseph T. Tennessee Coal, Iron & R. R. Co. Shelving, Steel. General Fireproduction

Sherardizing Plants. General Electric Co.

Shop Calling Systems—(See Systems, Communica-tions), Shops, Railroad—(See Build-ings, Iron, Steel and Steel Concrete).

hovels and Draglines. Industrial Works. hovels, Gas. Orton & Steinbromer Co.

Shovels, Scoop. Wood Shovel & Tool Co., Wyoming Shovel Works, The.

Shutters, Steel. Kinnear Mfg. Co. Siding, Corrugated and Plain. American Rolling Mill Co.,

American Short & The Plat-Co.
Inland Steel Co.
Johns-Manville, Inc.
Robertson Co., H. H.

Johns-Manville, Inc.
Robertson Co., H. H.

Bignal Accessories.
American Strombos Co.
Miscirle Storage Battery Co.
General Electric Co., Inc.
Bignals, Cressing.
American Strombos Co.
Bignals, Railway.
Chicago Ry. Signal & Supply Co.
Bignals, Railway.
Chicago Ry. Signal & Supply Co.
Bignals, Meter Cars.
Mudge & Co.
Raylights.
Robertson Co., H. H.
Biabs. Concrete Floor.
Federal Cement Tile Co.
Blabs. Stoel.
Andrews Steel Co., The
Teinessee Coal, Iron &
R. R. Co.
Siag, Blast Furnase.
Carnegie Steel Co.

Blatting Machines.

Beliers & Co., Inc., Wm.
Seap, Liquid.

West Disinfecting Co.
Bolder.

More-Jones Brass & Metal
Co.

Spalter—(See Zine).

Spikes.
American Steel & Wire Co.
Foster Co., L. B.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Ssen, Joseph T.
Tennessee Coal, Iron &
R. R. Co.

Splice Bars, Angle Carnegle Pteel Carnegle Steel Co Illinois Steel Co Inland Steel Co.

Spreaders, Car.
Bucyrus Co.
Jordan Co., O. F. Spring Plates or Seats.
Allegheny Steel Co.
National Malleable & Steel
Castings Co.

Springs.
American Steel & Wire Co.
American Steel & Poundress
Co.
Fort Pitt Spring & Mfg.
Co.
National Ry. Appliance Co.
Pittsburgh Spring & Steel
Co.

Pittsburgh Spring Co.
Railway Steel Spring Co.
Standard Steel Works.
Union Spring & Mfg. Co.
Springs, Shop Equipment.
Rycroon & Son, Joseph T.
Wenadium Steel.

Springs, Vanadium Steel. Pittsburgh Spring & Steel Railway Steel Spring Co.

Squares, Combination and Try and Mitro. Lufkin Rule Co., The.

Stacks, Steel.

American Bridge Co.
Leader Iron Works. Standpipes, Water. Fairbanks, Morse & Co. Stands, Switch and Target. Buda Co., The. Q & C Co., The.

Staybolt Drivers.
Independent Pneumatic Tool

Staybolts taybalta.

American Locomotive Co.

Bourne-Fuller Mfg. Co., The

Burden Iron Co., The.

Ewald Iron Co.

Falls Hollow staybelt Co.

Flannery Belt Co.

Reading Iron Co.

Robinsom Automatic Connector Co.

Ryerson & Sen, Joseph T.

Staybolts, Hellew.
Falls Hellew Staybolt Co.
Ryerson & Sen, Joseph T.

Falls Hellew Stayboit Ce.
Ryerson & Sen, Joseph T.
Steam Chasts.
Franklin Rallway Supply
Ce., Inc.
Steam Heat Hose, Fiexible
Metal.
Woodruff Ball-Joint Co.
Steam Shovels.
Orton & Steinbrenner Ce.
Steel, Alley.
Andrews Steel Co., The
Central Alley Steel Corp.
Interstate Iron & Steel Co.
Steel and Iron, Stainless.
Allegheny Steel Co.
Steel Rand Iron, Stainless.
Hilmois Steel Co.
Steel, East Tranted.
Bethlehum Steel Co.
Steel, Fireber.
Hilmois Steel Co.
Steel, Fireber.
Hilmois Reel Co.
Steel, Fireber.
Steel, Fressed Specialties,
Hals-Kilhum Ca.
Steel, Structural.
American Brown Bovert
Electric Corp.
Riaw-Knex Co.
Hilmois Steel Co.
Inland Steel Co.
Ryerson & See., Joseph T.
Steel, Toel.
Illinois Steel Co.
Midvale Co., The
Ryerson & See., Joseph T.
Tennessee Coal, Iron &

Steel and Iron, Stainless.
Allegheny Steel Co. Stoels, Alloys and Carbon. Ludium Steel Co. Steels, High-Speed Tool. Ludium Steel Co.

Step Jeints.
Q & C Co., The.
Rail Joint Co. Steps, Car (See Car Steps, Safety).

Stekers, Lecemetive, Lecometive Steker Co. Standard Stoker Co.

Stop Casings, Metal.
Edwards Co., O. M.
Stringers, Bridge.
Century Wood Preserving

Co.
Duncan Lumber Co.
Exchange Sawmills Sales Co.
Industrial Lumber Co.,
Long-Bell Lumber Co., The.
Michigan Wood Preserving

Co.
New England Wood Preserving Co.
Newman Lamber Co., J. J.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving

Stringers, Bridge, Greccoted. Century Wood Preserving Co. Michigan Wood Preserving

Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving

Stringers, Wood. Duncan Lumber Co. Superheaters.

Babcock & Wilcox Co.
Superheater Co., The.

Switch Boards.

American Brown Boveri
Electric Corp.
Graybar Electric Co., Inc. Johns-Manville, Inc. Switch Ties. Ayer & Lord Tie Co.

Ayer & Lord Tie Co.

Switches, Electric.

American Brown Boveri
Electric Corp.

Electric Eervice Supplies Co.
General Electric Co.
Graybar Electric Co., Inc.
Ohio Brass Co., The
Westinghouse Elec. & Mfg.
Co.

Switches and Switch Stands. Foster Co., L. B. McMyler Interstate Co. Ramape Ajax Corp.

Tacks.
Interstate Iron & Steel Co.
Tamping Machine, Tie.
Ingersoll-Rand Co., The
Syntron Co., The. Tacks.

Tamping Outfits, Tie. Ingersoll-Rand Co., The

Ingersoll-Band Co., The
Tank Flatures.
Fairbenks, Mores & Co.
Tanks, Air, Gas, Oil and
Water.
American Bridge Co.
American Lecomotive Co.
Babcock & Wileya Co.,
Koppel Industrial Car &
Equipment Co.
Leader Iron Works.
Pressed Steel Car Co.
Standard Tank Car Co.
Westinghouse Air Brake Co.
Tanks, Water.
American Lecomotive Co.

Westinghouse Air Brake Ce.
Tanks, Water.
American Lecomotive Ce.
Rabeeck & Wilcex Ce.
Leader Iron Works.
Tape, Insulating.
Johns-Manville, Inc.
Okonite Co., The.
Western Electric Cu.
Westinghouse Elec. & Mfg.
Co.

Westinghouse Blee. & Mfg.
Co.
Tapes. Measuring, Steel,
Linen and Cottom.
Lufkin Rule Co., The.
Taps. Staybelt.
Ryerson & Son, Jeseph T.
Teletype.
Morkrum-Kleinschmidt Corp.
Telegraph Apparatus, Printing.
Morkrum-Kleinschmidt Corp.
Telephone Service, Long Distunce.
American Telephone & Tele-

American Telephone & Tele-graph Co.

Terminals, Railread.

McClellan & Junkersfeld. Inc. Robinson Co., Dwight P.

Testers, Boiler. Sellers & Co., Inc., Wm. Testers, Gage. Ashton Valve Co. Testers, Ashton Valve Co. Testers, Staybolt, Flannery Bolt Co.

Testing Machines, Drep. Whiting Corp.

Thermostats.
Gold Car Heating & Lighting Co.

Tie Plates. Railroad Supply Co.

Tie Plates,
Railroad Supply Co.
Ties, Bridge.
Exchange Sawmills Sales Co.
Ties, Steel.
American Bridge Ce.
Ties, Wood.
Ayer & Lord Tie Co.
Exchange Sawmills Sales Co.
Ties, Zins Croessted.
Ayer & Lord Tie Co.
Ties, Zins Croessted.
Ayer & Lord Tie Co.
Tille, Cement Roofing.
Federal Cement Tile Co.
Timber.
Ayer & Lord Tie Co.
Duncan Lumber Co.
Exchange Sawmills Sales Co.
Industrial Lumber Co.
Long-Bell Lumber Co.
Long-Bell Lumber Co.
Long-Bell Lumber Co.
Long-Bell Lumber Co.
Ayer & Lord Tie Co.
Contury Weed Preserving
Co.
Michigan Wood Preserving
Co.
New Bugland Wood Pre-

Ce. New Bugland Wood Preserving Co. Ohle Wood Preserving Co. Pittaburgh Wood Preserving

Co. Timber, Bailway. Trebange Sawmills Sales Co.

Exchange Sawmills Sales Co. Tires.
Goodyear Tire & Rubber Co., Inc.
Fires, Steel.
Edgewater Steel Co.
Midvale Co., The
Railway Steel Spring Co.
Standard Steel Works Co.
Tools, High-Speed Steel.
Bird-Archer Co., The.
Tools, Pneumatic.
Independent Pneumatic Tool
Co.

Track Shates.
Q & C Co., The.
Track Tools.
Railroad Supply Co.
Track Work, Manganese. Buda Co., The.
Tracks, Industrial.
Vale & Towne Mfg. Co.

Tracks, industrial.

Vala & Towne Mfg. Co.

Tractors.

Elwell-Parker Electric Co.

Tractors. Industrial.

Baker-Raulang Co., The.

Elwell-Parker Electric Co.

Yale & Towne Mfg. Co.

Tractors. Turntable.

Whiting Corp.

Trailers. Industrial.

Yale & Towne Mfg. Co.

Train Pipe Connectors, Automatic.

Connolidated Connector

Corp., The

Robinson Automatic Connector

Co.

Robinson tor Co.

Robinson Automatic Cossector Co.
Tramways.
Bisw-Kest Co.
Tramways (Wire Rope).
American Steel & Wire Co.
Bisw-Kest Co.
Transfer Tebles.
American Bridge Co.
Indestrial Works.
Nichols & Bros., Goo. P.
Sellers & Co., Inc., Wm.
Whiting Corp.
Transformers.
American Brown Boverl
Electric Corp.
Westinghouse Elec. & Mfg.
Co.
Transmission Towers.
Bisw-Kest Co.
Trap Deers and Fixtures.
Edwards Co., O. M.
Trop Deers and Fixtures.
Edwards Co., O. M.
Trop Oreducts Corp.
Traps, Steam.
Crane Co.
Johns-Manville, Inc.

Treads, Safety. Ryersen & Son, Joseph T. Treatment, Water—(See Water Seftening and Purifying).

Trelleys, I-Beam. Yale & Towne Mfg. Co.

Yale & Towns Mfg. Ce.
Tracks, Car and Locometive.
American Locometive Ce.
American Steel Foundries.
Baldwin Locomotive Works.
Bettendorf Co., The.
Birdsboro Steel Foundry &
Machine Co.
Commonwesith Steel Co.
Frankin Railway Supply Co.
Koppel Industrial Car &
Equipment Co.
National Ry. Appliance Co.
Pressed Steel Car Co.
Standard Car Truck Co.
Symington Co., The.
Trucks, Electric Storage Battery.

tery. Elwell-Parker Electric Co.

Trucks, Industrial. Whiting Corp.

Trucks, Industrial Electric. Baker-Raulang Co., The. Elwell-Parker Electric Co.

Trucks, Motor.
General Motors Truck Co.
International Motor Co.
Mack Trucks, Inc.

Trucks, Trailer.
Commonwealth Steel oC.
Franklin Railway Supply
Co., Inc. Truck Frames-(See Frames Truck).

Tubes, Boiler.
Allegheny Steel Co.
Bethlehem Steel Co.
National Tube Co.
Ryerson & Son, Joseph T.
Tyler Tube & Pipe Co.

Tubes, Boiler, Charcoal Iron Reading Iron Co. Tubes, Nickel. International Nickel Co.

Tubes, Stay. Falls Hollow Staybolt Co. Tungsten Metal. Vanadium Corp. of America.

Vanadum Corp. of America. Turbines. Steam. American Brown Boveri Electric Corp. Westinghouse Elec. & Mfg. Oc.

Turbo Generators. American Brown Boveri Electric Corp. Riestric Service Supplies Co. General Electric Co.

General Electric Co.
Turnbuckies.
American Bridge Co.
Ohio Brass Co., The
Ryersen & Son, Joseph T.
Turntable Tracters.
Nichols & Bros., Geo. P.
Whiting Corp.

Nichols & Broa., Ges. P.
Whiting Corp.
Turntables.
American Bridge Co.
Foster Co., L. B.
Industrial Works.
McMyler Interstate Co.
Seliere & Co., Inc., Wm.
Whiting Corp.
Unewpiling Device.
Watchins Car Rfg. Co.
Union Ry. Buylpment Co.
Undon Ry. Buylpment Co.
Undon Ry. Buylpment Co.
Undarframes. Steel.
Commonwealth Steel Car
Roppel Industrial Car &
Buylpment Co.
Tennessee Coal, Iron &
R. R. Us.
Uphelstery, Car.
Mass. Mobair Plush Co.
Vacuum Cleaning Systems,
Syphon Jet.
Woodruff Ball-Joint Co.
Valve Gears, Locometive.
Pilliod Co., The.
Valves, Balanced Side.
Hammet, H. G.
Valves, Blown and Blow-Off.
Orane Co.
Valves, Brass.
Crane Co.
Pyle-National Co.
Valves, Brass.
Crane Co.
Franklin Rallway Supply
Co., Inc.
Valves, Globe and Gate.
Crane Co.

Valves, Globe, Angle Disc, Gate and Check. Ohio Brass Co., The O'Mailey Beare Valve Corp. Valves, Hydraulic. Birdsboro Steel Foundry & Machine Co. Southwark Fdry. & Machy. Co.

Machine Co.
Southwark Fdry. & Machy.
Co.
Valves, Piston.
Franklin Railway Supply
Co., Inc.
Valves, Pep., Safety and Relief.
Ashton Valve Co.
Crane Co.
Westinghouse Air Brake Co.
Valves, Freesure Regulating.
Crane Co.
Gold Car Heating & Lighting Co.
Valves, Safety.
Manning, Maxwell & Moore,
Inc.

Manning, Maxwell & Moore, Inc.
Valves, Tank Air.
Walves, Tank Air.
Waugh Equipment Co.
Valves, Threstie.
Bradford Corp.
Varnishes.
Lowe Bros. Co., The
National Ry. Appliance Co.
Valocipedes.
Fairbanks, Morse & Co.
Vantilators.
Electric Service Supplies Co.
Vantilators.
Cold Car Heating & Lighting Co.
Madge & Co.
Vapor Car Heating Co., Inc.
Ventilators, Shop and Reundhouse.

Mudge & Co.
Vapor Car Heating Co., Inc.
Ventilators, Shop and Roundhouse.
Johns-Manville, Inc.
Robertson Co., H. H.
Ventibules, Car.
Gould Coupler Co.
Wardrobes.
Wilson Corp., J. G., Tho.
Wardrobes, Relling and Disappearing Front — (See
Lockers).
Washer Cutting Machines.
Reliance Mfg. Co.
Washers.
National Malleable & Steel
Custings Co.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
Wine Ry. Appliance Co.
Washers, Lock.
National Lock Washer Co.,
The
Water Alarms — (See Low
Water Alarms).
Water Circulator.
Crane Boiler Equipment Co.
Water Gauges.
Nathan Mfg. Co.
Water Glass Protectors.
Okadee Co., The
Waterproofing Materials.
Johns-Manville, Inc.
Lebon Co., The.
Nelson Mfg. Co., B. F.
Water Purifying Materials
and Compounds.
Bird-Archer Co., The.
Dearborn Chemical Co.
Water Boftening and Purifying.
American Water Softener
Co.
Bird-Archer Co., The.

American Water Softener Co.
Bird-Archer Co., The.
Dearborn Chemical Co.
Weather Stripping.
Bdwards Co., O. M.
Tuco Freducts Corp.
Wedges, Automatie.
Franklis Railway Supply Co., Inc.
Wedges, Journal Box.,
American Steel Foundries.
Koppel Industrial Car &
Equipment Co.
National Malleable & Steel
Castings Co.
Pittsburgh Knife & Forge
Oc.

Castings Co.
Pittsburgh Knife & Porge
Ob.
Pressed Steel Car Co.
Railway Devices Co.
Steel Car Forge Co.
Weed Burners.
Fairmont Ry. Motors, Inc.
Weed Killer.
Chipman Chemical Ingineering Co.
Welders, Butt.
Federal Machine & Welder
Co.
Welders, Beam.
Federal Machine & Welder
Co.
Welders, Spot.
Federal Machine & Welder
Co.
Federal Machine & Welder
Co.

Welders, Tube. Federal Machine & Welder

Weiding Machines, Acetylene. Ryerson & Sen, Jos. T. Ryerson & Sen, Jos. T.
Welding Mackines, Electric.
General Electric Co.
National Ry. Appliance Co.
Ohio Brass Co., The
Ryerson & Sen, Jee. T.
Westinghouse Elec: & Mfg.
Co.

Oo.
Welding Machines, Flue.
Ryerson & Sun, Jos. T.
Welding and Outting Apparatus — (See Cutting and
Welding Apparatus).
Welding Reds.
Ohlo Brass Co., The
Ryerson & Sun, Jos. T.

Welding Supplies. General Electric Co.

Wheels, Cast Iron.

General Electric Co.
Wheels, Cast Iron.
Koppel Industrial Car &
Equipment Co.
Wheel Centers, Priving,
American Locemetive Co.
American Etesi Frundries.
Obmmonwealth Steel Co.
Edgewater Steel Co.
Hunt-Spiller Mig. Corp.
Standard Steel Works Co.
Union Steel Casting Co.
Wheels, Our and Locometive Co.
American Locometive Co.
American Etesi Frundries.
Baidwin Locometive Warks.
Carnegie Steel Company.
Edgewater Steel Co.
Illinois Nteel Co.
Koppel Industrial Car &
Equipment Co.
Pressed Steel Car Co.
Railway Steel Spring Co.
Standard Steel Spring Co.
Standard Steel Spring Co.
Standard Steel Works Co.
Wheels, Cast Iron.

Standard Steel Works Co.
Wheels, Car Wheels.
Ase'n of Mfrs. of Chilled
Car Wheels.
Griffin Wheel Co.
Pressed Steel Car Co.

Wheels, Hand, Pash and Mo-ter Car.
Ruds Co., The.
Pairmont Bailway Motors,
Inc.,
Mudge & Co.

Wheels, Mine Car, Carnegie Steel Co. Edgewater Steel Co.

Wheels, Rolled Steel.
Buds Co., The.
Wheels, Steel and Steel Tired.
American Steel Foundries.
Edgewater Steel Co.
Illinois Steel Co.
Illinois Steel Spring Co.
Standard Steel Spring Co.
Standard Steel Spring Co.
Mistles, Locometive.
American Strombee Co.
American Strombee Co.
American Strombee Co.
Westingheese Air Brake Co.
Window Fixtures.
Edwards Co., O. M.
Windows, Locometive Cab,
Clear Vision.
Prime Mfg. Co., The.
Windshields, Motor Care.
Mudge & Co.
Window Fixtures.
Tuco Products Corp.
Wirs.
American Streel & Wirs Co.
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# Freight train speed increased 22 per cent

An automatic block signal system recently installed on a single track division previously operated under manual block signals increased the average speed of freight trains from 13½ miles per hour to 16½ miles or an increase in speed of 22 per cent.

Under manual block signals train speed on curves was restricted by the restricted view of the track ahead. Under the automatic block signal system trains may be operated as if on straight track as the *clear* indication of the automatic signal virtually extends the view of the engineman so that he may run at normal speed even where the view ahead is restricted, confident of ample warning of a train ahead, an open switch or a broken rail.

An increase in freight train speed will make a corresponding increase in ton-miles per train hour. In 1925 on Class I Roads freight train speed per hour was 11.8 miles and gross ton-miles per train hour were 19,679. (Both were record figures.) An increase of 22 per cent in speed will give 14.4 miles per hour and 24,008 gross ton-miles per train hour.

A substantial increase in freight train speed makes automatic block signals a profitable investment.



More ton miles per train hour

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

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